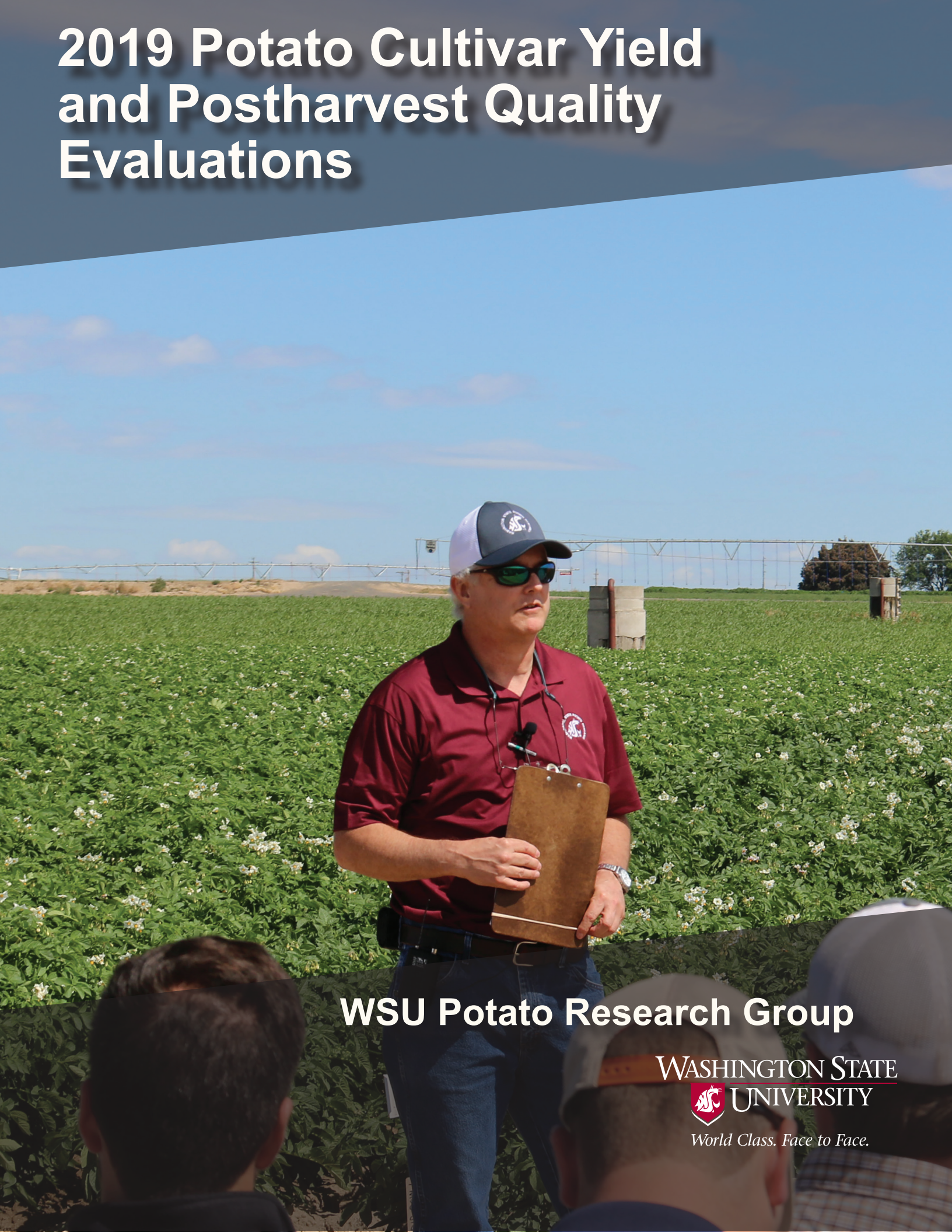
2019 Potato Cultivar Yield and Postharvest Quality Evaluations



WSU Potato Research Group

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2019 Potato Cultivar Yield and Postharvest Quality Evaluations

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Growers and Industry;
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Northwest Potato Consortium;
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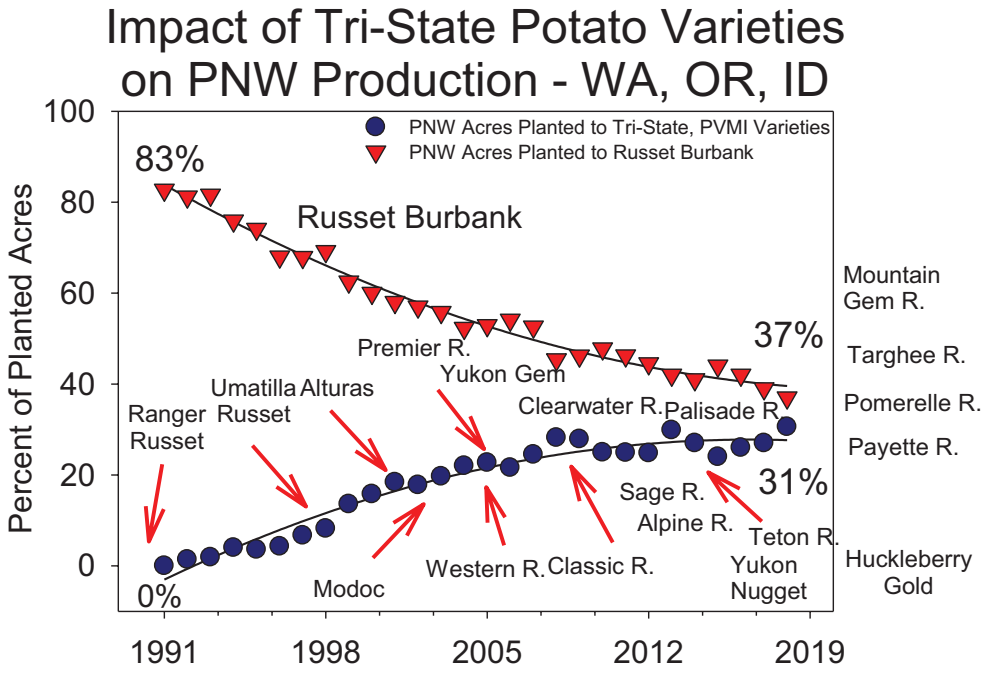
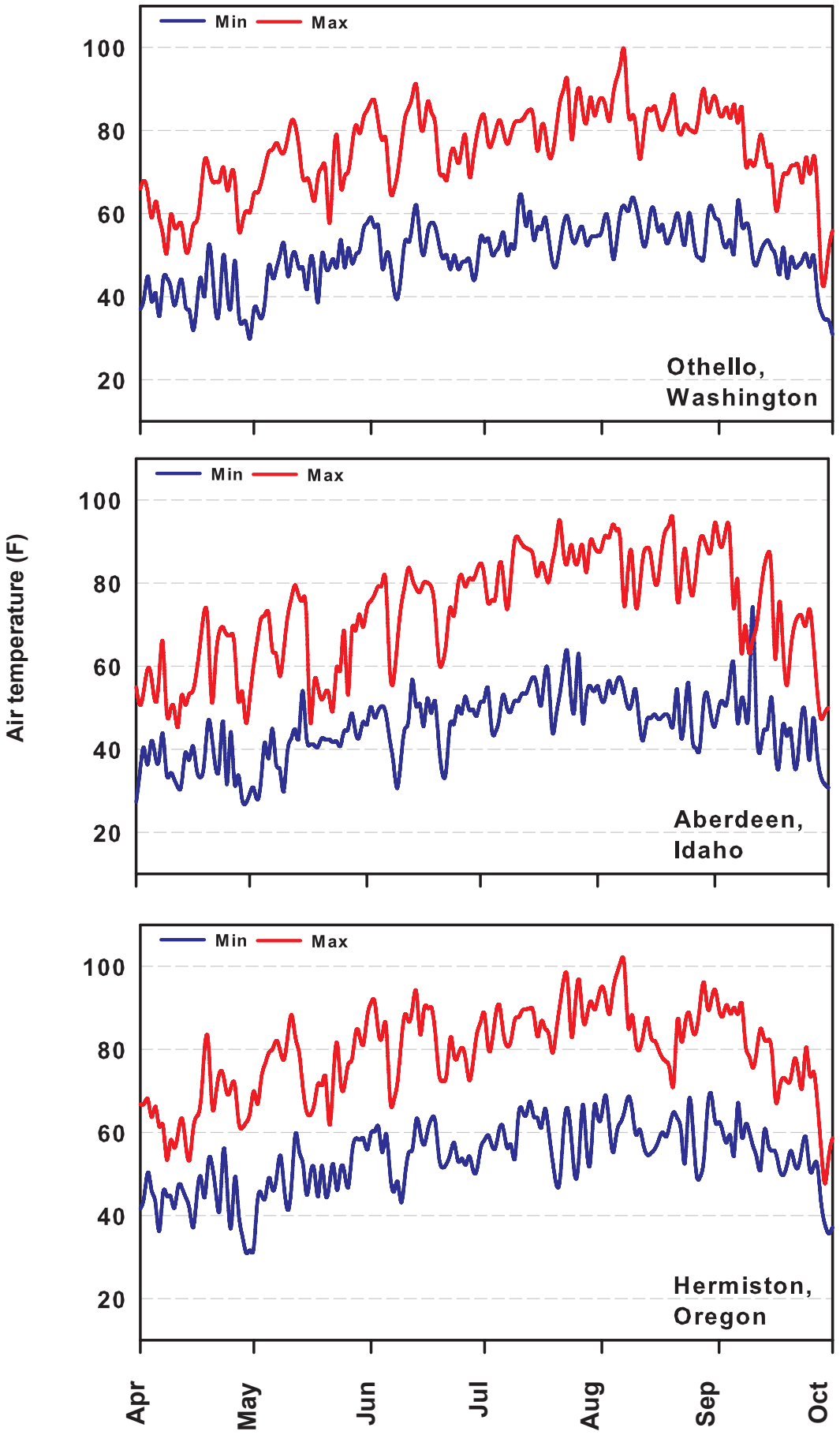
INTRODUCTION

The 2019 Washington "Potato Cultivar Yield and Postharvest Quality Evaluations" is an annual report providing detailed information about promising new potato clones and cultivars grown in Washington conducted by the **Washington State University (WSU) Potato Research Group**. **Our mission:** to identify and release new potato varieties that will provide profitable, sustainable production for the grower, improved competitiveness for the Washington and NW US potato industry, a healthy, inexpensive food supply for American consumers, and contributions towards a healthy environment. **Tri-State trials** include the newest clones which are created and evaluated in ID, OR, and WA by the USDA/ARS of Aberdeen, ID & Prosser, WA, Univ. of ID, OR State Univ., and WA State Univ. **Regional trials** include advanced clones from, and evaluated by, ID, OR, WA, CO, TX, and CA. Potato Commissions from the Tri-State area support and fund much of the variety development efforts. **Potato Variety Management Institute (PVMI)** is a nonprofit organization that licenses and promotes Tri-State varieties. PVMI collects royalties from the varieties which are then distributed among the Tri-State research programs to support the ongoing development efforts. Learn more at www.pvmi.org.

Recent Accomplishments: The effect of the Tri-State Potato Variety Development Program on the Northwest potato industry has been substantial. **Ranger Russet, Umatilla Russet, Clearwater Russet, Alturas, and Bannock Russet** are examples of russet cultivars released from the Tri-State program that have greatly benefited the United States and Northwest potato industry, being the 3rd, 4th, 6th, 7th, and 12th most widely grown cultivars in the United States in 2018, respectively, with Tri-State varieties representing 31%, or 266,400 acres, of the fall crop nationally. (NASS, Crop Production, November 2018). **Ranger Russet, Umatilla Russet, and Clearwater Russet** were the 3rd, 4th, and 5th most widely grown cultivars in the PNW (ID, OR, WA) in 2018, respectively, and accounted for 25% of the PNW planted acreage. Varieties recently released by the Tri-State program are now produced on more than 160,900 acres in the Pacific Northwest with value to growers estimated at approximately $810 million. In the past 16 years, the US farm-gate value of Tri-State varieties has increased by approximately $240 million.



2019 Growing Season Temperatures



Guide to Clone Designations

Example: ATX91137-1Ru		
	ATX91137-1Ru	Breeding Program (Aberdeen, ID)
	A**TX**91137-1Ru	Selection Site (Texas)
	ATX**91**137-1Ru	Year of Cross (1991)
	ATX91**137**-1Ru	Cross Number (137)
	ATX91137-**1**Ru	Tuber Selection (1)
	ATX91137-1**Ru**	Russet (Ru)

Location Codes

Designation		Breeding Program	Selection Program	Other
A	=	**A**berdeen, Idaho	Aberdeen, Idaho	
AO	=	**A**berdeen, Idaho	**O**regon	
AOA	=	**A**berdeen, Idaho	**O**regon	**A**berdeen,Idaho
ATX	=	**A**berdeen, Idaho	**Tex**as	
BTX	=	**B**eltsville, Maryland	**Tex**as	
CO	=	**Co**lorado		
MWTX	=	**M**adison **W**isconsin	**Tex**as	
NDA	=	**N**orth **D**akota	**A**berdeen, Idaho	
NY	=	**N**ew **Y**ork		
PA	=	**P**rosser, WA	**A**berdeen, Idaho	
POR	=	**P**rosser, WA	**Or**egon	
TC	=	**T**exas	**C**olorado	
TXA	=	**Tex**as	**A**berdeen, Idaho	
TXNS	=	**Tex**as		**N**orkotah **S**train

Miscellaneous Designations

PA97**B**3-2	B	=	Chuck Brown's cross
A93157-6**LS**	LS	=	Low Sugar
CO94165-3**P/P**	P/P	=	Purple skin & Purple flesh
A96741-2**R**	R	=	Red skin
CO94183-1**R/R**	R/R	=	Red skin / Red flesh
VC0967-2**R/Y**	R/Y	=	Red skin / Yellow flesh
ATX92230-1**Ru**	Ru	=	Russet skin
VC1009-1**W/Y**	W/Y	=	White skin & Yellow flesh
A97066-42**LB**	LB	=	Late Blight resistance
AC9923**PW/Y**	PW/Y	=	Purple skin with White eyes/ Yellow flesh
AC9653**P/Y**	P/Y	=	Purple skin/Yellow flesh
CO977-2**P/PW**	P/PW	=	Purple skin/Purple & White flesh
A99029-3**E**	E	=	Early maturing
A0008-1**TE**	TE	=	TEtonia, ID Selection, Early maturing
A07008-4**T**	T	=	Tetonia, ID Selection, Late maturing
A06914-3**CR**	CR	=	Corky Ringspot resistance
A06862-18**VR**	VR	=	Virus Resistance

OVERALL CULTIVAR & CLONE PERFORMANCE

Merit Score Methods

Overview: Overall performance for each entry was rated on a scale of 1 to 5; 5 indicating the best performance possible. The methods are explained below. Economic analysis methods are explained on pages 16 (Fresh) and 17 (Process).

FRESH MARKET MERIT SCORE METHODS:

75% Fresh market economic value

25% Internal quality – blackspot bruise, shatter bruise, hollow heart, internal brown spot, and brown center. An average merit value is taken. Of the five internal categories listed above, the worst internal defect or bruise rating for each cultivar is weighted 50% so serious bruise or defect problems are reflected in the final merit score.

Researcher's Discretion: The overall merit score may be reduced by up to 50% for any unacceptable trait not quantified in the data (e.g. poor appearance or poor flavor).

EARLY PROCESS MARKET MERIT SCORE METHODS:

75% Early harvest process market economic value

25% Internal quality – blackspot bruise, shatter bruise, hollow heart, internal brown spot, and brown center. An average merit value is taken. Of the five internal categories listed above, the worst internal defect or bruise rating for each cultivar is weighted 50% so serious bruise or defect problems are reflected in the final merit score.

Researcher's Discretion: The overall merit score may be reduced by up to 50% for any unacceptable trait not quantified in the data.

LATE PROCESS MARKET MERIT SCORE METHODS:

For the late process market, a merit score is listed for both field and post-harvest performance.

Field/Economic Performance – methods are the same as "Early Process Market Merit Score Methods" shown above, with the exception that a late harvest economic analysis is conducted.

Post-Harvest Performance – see "Postharvest Procedures" section near front of book.

Researcher's Discretion:
The overall merit score may be reduced by up to 50% for any unacceptable trait not quantified in the data.

WA Multi-Year Summaries of Graduating Russet Entries and Reference Varieties

Entry	Year	Early/Late* Harvest Total Yield	US # 1 & 2 Yield > 6 oz	Specific Gravity	Average Tuber Weight/ Number per Plant	Bruise Blackspot/ Shatter	Internal** Issues	Merit Scores (5 = Best) Field Performance Early/Late Fresh	Field Performance Early/Late Process	Postharvest Processing Performance
		CWT/A	% of Total		oz/number	%				
A07061-6	2019	782/1167	85	1.071	9.7/11.4	0/36	none	1.9/2.2	2.9/1.2	2.2
	2018	517/1001	82	1.077	8.7/10.9	28/38	3% IBS	1.0/1.9	1.6/2.8	2.1
	2017	485/981	78	1.082	7.6/11.2	8/65	none	0.7/2.0	2.1/3.3	2.4
	2016	613/992	68	1.077	7.0/11.6	28/68	none	2.1/2.1	1.1/1.3	2.8
	Not an early variety. Not recommended for fresh pack. Bad skin, spotty russeting, round and short when grown in Columbia Basin. Specific gravity may be an issue. Suggested discard									
A08433-4VR	2019	782/1117	85	1.072	13.6/7.8	0/44	3% HH	2.0/1.3	3.1/1.4	2.2
	2018	570/923	90	1.082	12.0/7.4	13/33	none	2.3/1.7	3.6/4.1	2.9
	2017	532/844	85	1.081	9.2/8.0	0/58	none	2.1/1.9	2.8/3.7	2.0
	Tuber shape often irregular (pear shaped) and flat, ugly skin. Not recommended for fresh pack. Suggested discard									
Ranger R.	2019	599/1051	86	1.078	11.5/8.8	19/19	none	NA	3.4/3.2	3.2
	2018	491/899	86	1.082	11.8/7.3	60/30	3% IBS	NA	3.7/3.6	4.0
	2017	453/754	81	1.104	8.3/7.9	33/48	none	NA	2.7/2.9	2.4
	2016	465/788	77	1.087	8.4/8.8	58/13	none	NA	2.6/4.6	3.2
	2015	479/851	77	1.086	7.1/8.8	17/23	none	NA	3.6/3.8	4.9
	Long, shape variable at times, yet uniform other times. 7 to 9 tubers per plant typical.									
R. Burbank	2019	584/1085	77	1.077	11.4/9.1	6/64	12% IBS	1.6/1.3	3.3/2.5	1.5
	2018	633/863	81	1.080	10.4/7.9	48/58	3% IBS	2.4/1.3	3.9/2.2	2.2
	2017	428/752	77	1.088	8.2/8.0	13/53	10% HH, 13% BC	1.0/0.9	1.6/3.2	2.3
	2016	526/734	63	1.085	6.8/9.0	57/57	14% BC, 4% IBS	0.9/1.3	2.0/3.2	2.2
	2015	460/677	70	1.072	7.7/8.0	41/59	3% BC	1.3/1.4	2.9/1.2	2.7
	Shape typically variable, often with many growth cracks and knobs. 7 to 9 tubers per plant typical.									
R. Norkotah (Fresh Market) only	2019	575/814	79	1.065	9.0/8.6	0/15	none	3.4/2.6	NA	NA
	2018	511/785	86	1.071	10.4/7.1	25/25	none	2.8/2.0	NA	NA
	2017	545/685	76	1.076	7.7/7.7	23/43	none	5.0/2.6	NA	NA
	2016	473/696	63	1.076	6.8/8.3	24/12	none	2.5/2.5	NA	NA
	2015	468/602	70	1.065	7.7/7.6	21/29	none	1.7/2.5	NA	NA
	Shape and skin typically very uniform, size profile typically on the small side. 7 to 8 tubers per plant typical.									
Shepody (Early Harvest) only	2019	788	83	1.076	9.8/8.4	0/10	none	NA	3.9/NA	-
	2018	621	87	1.072	12.6/5.1	3/0	none	NA	3.9/NA	-
	2017	415	80	1.077	8.3/6.0	7/0	none	NA	3.4/NA	-
	2016	502	82	1.092	11.1/4.9	29/24	none	NA	4.3/NA	-
	2015	487	72	1.076	7.6/6.7	7/7	none	NA	3.4/NA	-
	Early-harvest processing variety. Early-harvest post-harvest merit not evaluated as this and most varieties typically produce acceptable fries directly from the field. 5-6 tubers per plant typical.									

*Early Harvest ~ 110 days after planting, Late Harvest ~ 150 DAP.
**HH = Hollow heart, BC = brown center, IBS = internal brown spot.

2019 Tri-State Specialty Potato Clones - Washington State University

2019 Tri-State Specialty Trial	US #1 Yield 2019				(See also Tri-State Specialty Section near end of book)
	US#1 Yield CWT/A	0-6 oz -----%	6-10oz -----	Fresh Market Appearance 5 = best	Comments
Red Skin/White Flesh*					
Chieftain	737	28	43	3.3	Flat, eyes a bit deep, with poor skin set.
A08122-12R	791	70	26	4.0	Mostly nice, good color, medium size.
NDA8512C-1R	679	36	45	2.7	Nice dark red skin, skin set not good, some irrgegular shapes.
A08112-7R	527	76	22	3.7	Nice dark red, uniform size, low yields.
Red-Purple/Yellow Flesh					
ATTX05175S-1R/Y	712	76	22	3.3	Flat, deep eyes, nice red color, fairly uniform size.
COTX04193S-2R/Y	793	61	29	3.7	Flat, nice red color.
Yellow Flesh					
Yukon Gold	569	16	30	3.7	Large, nice yellow skin, mix of sizes.
COA13039-4Y	678	61	33	3.3	Some russeting, sprouts starting, range of sizes.
COA13142-2Y	535	98	2	2.5	Small, feathery skin. Pink outside of eyes too.

*Skin/Flesh Color: R = Red, W = White, Y = Yellow, P = Purple, Rus = Russet, Buff = off-white with or without light russeting.

Chieftain

A08122-12R

ATTX05175S-1R/Y

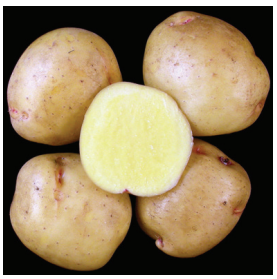
Yukon Gold

A08112-7R

NDA8512C-1R

COTX04193S-2R/Y

COA13039-4Y



COA13142-2Y

At-Harvest Grading Comments & Fresh Market Appearance

Newest Lines - 2019 Tri-State Trials			
	Fresh Market Appearance 1-5 (5 = Best)		
Clone	2019	2018	Tuber Appearance Comments*
Early Harvest Tri-State			
Ranger Russet	2.3	2.7	Irregular shapes, large tubers, mostly typy.
Russet Burbank	2.3	3.3	Mostly typy, good length, irregular shapes.
Russet Norkotah	3.3	3.0	Smaller, typy, good skin.
Shepody	2.0	2.0	Smaller ones, round, mix of shapes.
A09022-4	2.7	-	Very short, round, small and plump.
A10007-3	2.7	-	Uniformly large, too large for fresh, bad skin.
A10595-13sto	2.0	-	Uniformly large, spotty skin.
A11194-1	2.3	-	Plump, oval, lots of small ones.
AOR08540-1	3.7	3.7	Typy, plump, skin somewhat spotty, some short.
AOR10204-3	2.3	3.0	Lots of points, poor skin set, ok length, large tubers.
AOR11217-3	3.3	-	Typy, skin ok, some lenticils, some short.
COA11013-2	2.0	-	Mostly typy, spotty skin, some irregular shapes, light skin.
Late Harvest Tri-State			
Ranger Russet	3.0	2.5	Good skin, long and skinny, mostly typy.
Russet Burbank	2.3	2.0	Somewhat typy, but a lot of ugly tubers.
Russet Norkotah	3.3	3.3	Nice skin, good shape and size.
A09022-4	2.0	-	Light skin, round and long.
A10007-3	2.0	-	Large deep eyes, lumpy with light skin, spotty.
A10595-13sto	2.0	-	Bad skin, spotty russeting. Large, lumpy, non uniform shapes.
A11194-1	2.0	-	Large, lumpy, plump, some round with deep eyes.
AOR08540-1	3.0	2.8	Typy, could be a fresh pack, greening issue a concern.
AOR10204-3	2.8	2.8	Large and long, somewhat typy, some nice skin, some bad.
AOR11217-3	3.5	-	Typy, ok skin, some rhizoc.
COA11013-2	2.8	-	Very long and skinny, some skin issues.

*Typy - Visually appealing, uniform tuber shape.

AOR11217-3

AOR08540-1

AOR08540-1

AOR11217-3

At-Harvest Grading Comments & Fresh Market Appearance

Advanced Lines - 2019 Regional Trials				
	Fresh Market Appearance 1-5 (5 = Best)			
Clone	2019	2018	2017	Tuber Appearance Comments*
Early Harvest Regional				
Ranger Russet	2.3	3.3	3.0	Many irregular tuber shapes, ok skin and length.
Russet Burbank	2.0	2.0	2.7	Mix of shapes, cracks, #2's, some typy, smaller.
Russet Norkotah	4.0	3.0	4.0	Typy, smaller, nice skin, good length.
Shepody	2.0	2.0	3.0	Round, long, light skin, some large.
A07061-6	1.3	1.0	2.0	Spotty, scabby skin, round not a dual variety.
A071012-4BF	3.3	2.7	2.0	Smaller, round, elephant hide on several, not early.
A07769-4	3.0	2.3	3.0	Smaller, round, not early.
A08422-4VRsto	2.7	-	-	Very short, feathery skin, small. Not an early variety.
A08433-4VR	1.3	2.0	2.3	Large, nonuniform shape, lots of pears. Discard.
A10021-5TE	2.3	2.3	2.3	Typy, good length, bad skin.
AO02183-2	3.0	3.3	-	Very large, typy, skin rough, lots of lenticils.
AOR07781-5	2.3	2.7	2.7	Some typy, deep eyes, short.
CO09076-3RU	3.0	2.5	-	Somewhat typy, larger, some curves.
CO09205-2RU	3.5	3.3	-	Typy, small, good skin, not early.
CO10087-4RU	4.0	-	-	Small, typy, good skin, not early.
CO10091-1RU	3.7	-	-	Small, round, typy, but not early.
COTX05095-2Ru/Y	3.0	3.0	-	Not early, short and round with feathery skin.
OR12133-10	2.0	2.7	-	Not early, small, lots of points, pears, discard.
POR12NCK50-1	3.0	3.7	4.0	Dark skin, mostly typy, not early.
Late Harvest Regional				
Ranger Russet	2.5	2.5	2.3	Long, skinny, lot of typy ones, some not so much.
Russet Burbank	2.0	2.5	2.3	Non uniform shape, some typy.
Russet Norkotah	3.3	3.3	4.0	Mostly typy, with nice skin, medium dark russet.
A07061-6	1.3	1.8	2.0	Spotty skin, short and round.
A071012-4BF	2.5	2.3	2.5	Large, blocky, bad skin, typy shape.
A07769-4	2.5	2.8	2.3	Large and blocky, but bad skin.
A08422-4VRsto	2.0	-	-	Larger, plump, pear shaped, with light skin.
A08433-4VR	1.3	2.0	1.3	Large, flat, ugly, nonuniform shape.
A10021-5TE	1.8	2.0	1.8	Bad scab, bad skin, ok shape.
AO02183-2	2.0	2.8	-	Larger, bad lenticils, mostly typy.
AOR07781-5	3.0	3.0	2.5	Nice skin, deep eyes, some points, nonuniform shapes
CO09076-3RU	1.0	2.3	-	Ugly, a lot of greens, #2's and cracks.
CO09205-2RU	2.5	4.0	-	Some typy, skinny, long, non uniform shape.
CO10087-4RU	3.0	-	-	Too small, smooth shape, discard.
CO10091-1RU	2.5	-	-	Small river rocks with nice skin, discard.
COTX05095-2Ru/Y	2.0	2.3	-	Too small, short and round. Discard.
OR12133-10	1.3	2.5	-	Light spotty, ugly skin, oval shaped.
POR12NCK50-1	2.5	3.0	3.0	Prescab, lenticils, bumpy, poor skin set.

*Typy - Visually appealing, uniform tuber shape

A071012-4BF

CO10087-4RU

R. Norkotah

AOR07781-5

FRESH MARKET MERIT - NEWEST LINES
2017-2019

(5 = best) - Entries ranked by means

EARLY HARVEST - Fresh Market Merit Scores

	Entry	Mean	2019	2018	2017
1	AOR10204-3	**3.1**	2.5	3.8	-
2	AOR08540-1	**3.0**	3.0	3.0	-
3	Russet Norkotah	**2.9**	2.1	2.3	4.3
4	AOR11217-3	**2.7**	2.7	-	-
5	Russet Burbank	**1.5**	1.7	1.9	1.1
6	Ranger Russet	**1.5**	1.8	1.4	1.3
7	A11194-1	**1.3**	1.3	-	-
8	A10595-13sto	**1.1**	1.1	-	-
9	A10007-3	**0.8**	0.8	-	-
10	COA11013-2	**0.7**	0.7	-	-
11	A09022-4	**0.6**	0.7	0.4	-

LATE HARVEST - Fresh Market Merit Scores

	Entry	Mean	2019	2018	2017
1	AOR11217-3	**3.9**	3.9	-	-
2	Russet Norkotah	**2.4**	2.6	2.1	2.5
3	A11194-1	**2.3**	2.3	-	-
4	AOR08540-1	**1.8**	2.3	1.3	-
5	AOR10204-3	**1.7**	1.9	1.5	-
6	COA11013-2	**1.7**	1.7	-	-
7	A09022-4	**1.4**	2.0	0.8	-
8	Ranger Russet	**1.3**	2.1	0.9	0.9
9	A10595-13sto	**1.2**	1.2	-	-
10	A10007-3	**0.9**	0.9	-	-
11	Russet Burbank	**0.9**	1.2	0.5	0.9

For more information on these cultivars, see the Early and Late Harvest Regional Trial Sections in this Book.
The dash (" - ") indicates the clone was not yet entered into the trial.

FRESH MARKET MERIT - ADVANCED LINES
2015-2019

(5 = best) - Entries ranked by means

EARLY HARVEST - Fresh Market Merit Scores

	Entry	Mean	2019	2018	2017	2016	2015
1	Russet Norkotah	**3.1**	3.4	2.8	5	2.5	1.7
2	AO02183-2	**3.0**	3.4	2.5	-	-	
3	POR12NCK50-1	**3.0**	2.6	2.9	3.4	-	-
4	Ranger Russet	**2.6**	1.7	2.6	3.1	2.8	2.7
5	A07769-4	**2.5**	3.0	2.0	2.4	-	-
6	A10021-5TE	**2.4**	2.3	2.4	2.4	-	-
7	A071012-4BF	**2.2**	3.4	2.0	1.9	1.5	-
8	AOR07781-5	**2.2**	2.0	1.9	2.4	2.3	-
9	A08433-4VR	**2.1**	2.0	2.3	2.1	-	-
10	OR12133-10	**2.0**	1.9	2.1	-	-	-
11	COTX05095-2Ru/Y	**1.9**	2.1	1.7	-	-	-
12	CO10087-4RU	**1.9**	1.9	-	-	-	-
13	CO09205-2RU	**1.8**	2.1	1.5	-	-	-
14	A08422-4VRsto	**1.7**	1.9	1.4	1.8	-	-
15	CO09076-3RU	**1.5**	1.1	1.9	-	-	-
16	Russet Burbank	**1.4**	1.6	2.4	1.0	0.9	1.3
17	A07061-6	**1.4**	1.9	1.0	0.7	2.1	-
18	CO10091-1RU	**1.3**	1.3	-	-	-	-

LATE HARVEST - Fresh Market Merit Scores

	Entry	Mean	2019	2018	2017	2016	2015
1	Russet Norkotah	**2.5**	2.6	2.0	2.6	2.5	2.5
2	AO02183-2	**2.3**	2.3	2.4	-	-	-
3	POR12NCK50-1	**2.1**	2.3	2.2	1.9	-	-
4	A07061-6	**2.1**	2.2	1.9	2.0	2.1	-
5	AOR07781-5	**1.9**	1.6	1.7	1.4	3.0	-
6	OR12133-10	**1.9**	1.8	2.0	-	-	-
7	A08422-4VRsto	**1.9**	1.9	-	-	-	-
8	A07769-4	**1.7**	1.8	1.3	2.2	-	-
9	A08433-4VR	**1.6**	1.3	1.7	1.9	-	-
10	A071012-4BF	**1.6**	1.6	1.2	1.8	1.7	-
11	CO10087-4RU	**1.5**	1.5	-	-	-	-
12	CO10091-1RU	**1.4**	1.4	-	-	-	-
13	Ranger Russet	**1.4**	1.4	0.9	1.0	2.2	1.8
14	Russet Burbank	**1.2**	1.3	1.3	0.9	1.3	1.4
15	CO09076-3RU	**1.1**	0.9	1.3	-	-	-
16	CO09205-2RU	**1.0**	0.9	1.2	-	-	-
17	A10021-5TE	**1.0**	1.5	0.7	0.9	-	-
18	COTX05095-2Ru/Y	**0.9**	1.3	0.5	-	-	-

For more information on these cultivars, see the Early and Late Harvest Regional Trial Sections in this Book. The dash (" - ") indicates the clone was not yet entered into the trial.

WA PROCESS MARKET MERIT - NEWEST LINES
2015-2019

(5 = best) - Entries ranked by Field Performance means

EARLY HARVEST - Process Market Merit Scores

	Entry	Field Performance Mean	Field Performance Only* 2019	2018	2017
1	AOR11217-3	**4.9**	4.9	-	-
2	AOR08540-1	**4.0**	4.0	3.9	-
3	Shepody	**3.9**	3.4	3.4	5.0
4	AOR10204-3	**3.7**	4.0	3.4	-
5	Ranger Russet	**3.6**	3.8	3.4	3.7
6	Russet Burbank	**3.6**	3.6	3.8	3.4
7	A10595-13sto	**3.4**	3.4	-	-
8	A11194-1	**2.9**	2.9	-	-
9	Russet Norkotah	**2.5**	1.6	2.6	3.4
10	COA11013-2	**2.3**	2.3	-	-
11	A09022-4	**2.0**	2.2	1.7	-
12	A10007-3	**1.3**	1.3	-	-

*Postharvest values are not given for the Early Harvest Trial because all varieties typically fry well when delivered directly from the field and cold storage is not typical. The dash (" - ") indicates the clone was not yet entered into the trial.

LATE HARVEST - Process Market Merit Scores

		Field & Postharvest Processing Performance							
		All Years		2019		2018		2017	
	Entry	Field Mean	Post Harvest Mean	Field	Post Harv	Field	Post Harv	Field	Post Harv
1	AOR11217-3	**4.5**	**3.9**	4.5	3.9	-	-	-	-
2	Ranger Russet	**3.0**	**3.0**	3.5	3.2	2.4	3.3	3.1	2.6
3	A10007-3	**2.7**	**1.7**	2.7	1.7	-	-	-	-
4	A10595-13sto	**2.6**	**3.2**	2.6	3.2	-	-	-	-
5	A11194-1	**2.5**	**2.2**	2.5	2.2				
6	AOR10204-3	**2.5**	**na**	3.1	na	1.9	na	-	-
7	A09022-4	**2.4**	**4.0**	2.9	4.2	1.9	3.7	-	-
8	COA11013-2	**2.3**	**3.6**	2.3	3.6	-	-	-	-
9	AOR08540-1	**2.2**	**na**	1.9	na	2.5	na	-	-
10	Russet Burbank	**2.0**	**2.4**	2.1	2.6	1.3	2.3	2.7	2.2
11	Russet Norkotah	**1.6**	**na**	1.6	na	1.6	na	1.5	na

For more information on these cultivars, see the Early and Late Harvest Regional Trial sections in this book. Varieties with 'fresh' were designated for direct processing or fresh market only and are indicated with "na".

WA PROCESS MARKET MERIT - ADVANCED LINES
2015-2019

(5 = best) - Entries ranked by Field Performance means

EARLY HARVEST - Process Market Merit Scores

	Entry	Field Performance Mean	Field Performance Only* 2019	2018	2017	2016	2015
1	AOR07781-5	**4.4**	4.9	3.9	4.6	3.7	4.9
2	OR12133-10	**4.1**	3.8	4.4	-	-	-
3	POR12NCK50-1	**4.0**	4.2	4.1	3.7	-	-
4	A07769-4	**4.0**	3.9	4.0	3.5	4.5	-
5	Shepody	**3.7**	3.9	3.7	3.9	3.5	3.4
6	A10021-5TE	**3.6**	4.0	3.3	3.3	-	-
7	A071012-4BF	**3.4**	4.4	3.2	4.3	2.2	3.0
8	A08422-4VRsto	**3.4**	3.1	3.1	4.0	- -	-
9	AO02183-2	**3.4**	4.3	3.0	3.0	-	-
10	Ranger Russet	**3.2**	3.4	3.2	3.7	3.2	2.7
11	Russet Norkotah	**3.1**	2.7	3.2	2.5	3.0	4.0
12	A08433-4VR	**3.1**	3.1	3.1	3.6	2.8	2.8
13	COTX05095-2Ru/Y	**2.9**	3.2	2.8	2.8	-	-
14	Russet Burbank	**2.6**	3.3	2.5	3.9	1.8	1.6
15	CO09076-3RU	**2.6**	1.3	3.2	3.2	-	-
16	CO10087-4RU	**2.2**	2.2	-	-	-	-
17	A07061-6	**1.9**	2.9	2.0	1.6	2.1	1.1
18	CO09205-2RU	**1.8**	2.3	1.6	1.6	-	-
19	CO10091-1RU	**1.0**	1.0	-	-	-	-

*Postharvest values are not given for the Early Harvest Trial because all varieties typically fry well when delivered directly from the field and cold storage is not typical. The dash (" - ") indicates the clone was not yet entered into the trial.

LATE HARVEST - Process Market Merit Scores

Field & Postharvest Processing Performance

		All Years		2019		2018		2017		2016		2015	
	Entry	Field Mean	Post Harvest Mean	Field	Post Harv	Field	Post Harv	Field	Post Harv	Field	Post Harv	Field	Post Harv
1	AO02183-2	**4.7**	**4.4**	4.5	4.0	4.9	4.7	-	-	-	-	-	-
2	A07769-4	**3.8**	**3.0**	3.0	2.8	3.8	3.6	4.6	2.6	-	-	-	-
3	A071012-4BF	**3.7**	**2.1**	4.8	2.7	4.5	2.3	2.4	1.7	3.0	1.8	-	-
4	POR12NCK50-1	**3.6**	**3.1**	4.5	3.4	3.3	2.6	3.7	3.2	2.9	-	-	
5	Ranger Russet	**3.6**	**3.5**	3.2	3.2	3.6	4.0	2.9	2.4	4.6	3.2	3.8	4.9
6	AOR07781-5	**3.1**	**3.6**	3.2	3.8	2.9	3.9	2.4	2.8	4.0	4.0	-	-
7	A08433-4VR	**3.1**	**2.4**	1.4	2.2	4.1	2.9	3.7	2.0	-	-	-	-
8	A10021-5TE	**2.8**	**3.9**	2.5	3.5	3.2	4.2	-	-	-	-	-	-
9	A08422-4VRsto	**2.5**	**1.6**	2.5	1.6	-	-	-	-	-	-	-	-
10	Russet Burbank	**2.4**	**2.2**	2.5	1.5	2.2	2.2	3.2	2.3	3.2	2.2	1.2	2.7
11	OR12133-10	**2.1**	**3.2**	1.2	2.4	2.6	3.9	2.6	-	-	-	-	
12	A07061-6	**2.1**	**2.4**	1.2	2.2	2.8	2.1	3.3	2.4	1.3	2.8	-	-
13	CO09076-3RU	**1.7**	**na**	1.5	na	2.0	na	-	-	-	-	-	-
14	CO10087-4RU	**1.7**	**3.0**	1.7	3.0	-	-	-	-	-	-	-	-
15	Russet Norkotah	**1.7**	**na**	2.2	na	1.5	na	1.3	na	-	-	-	-
16	CO10091-1RU	**1.6**	**2.1**	1.6	2.1	-	-	-	-	-	-	-	-
17	CO09205-2RU	**1.5**	**2.7**	1.6	2.5	1.4	2.8	-	-	-	-	-	-
18	COTX05095-2Ru/Y	**1.2**	**na**	1.4	na	1.1	na	-	-	-	-	-	-

For more information on these cultivars, see the Early and Late Harvest Regional Trial sections in this book. Varieties with 'fresh' were designated for direct processing or fresh market only and are indicated with "na" .

Fresh Market Value - Methods

Economic Potential

The gross return in U.S. dollars per acre for each trial entry was calculated using WA (Columbia Basin) four-year average fresh potato prices. Production costs per acre were not applied. All assumptions are listed in the table below. Assessing the fresh value of a given lot of potatoes is difficult because the actual market allows fresh-pack sheds to utilize a mix of tuber sizes, packaging, and marketing opportunities to maximize income potential. Following discussions with actual pack-sheds and complying with USDA standards, the packaging and size ranges described below provide a good base for variety comparison. A packaging and handling fee (pack-shed operating fee) of $4.00 was assessed on each CWT of potatoes. This economic evaluation does not fully account for consumer preferences for each trial entry.

Fresh-pack market 4-year average shipping point prices per tuber size and grade with associated pack-fees.

	Range of Tuber Sizes for Each Package Type and USDA Grade		Four Year WA State Columbia Basin	Pack-Shed Fee: Packaging	
Markets/Packaging[a]	U.S. No. 1[b]	U.S. No. 2	Average Prices[c]	and Handling	Adjusted Value
50 lb cartons	oz	oz	$/CWT	$/CWT	$/CWT
100 Count	7 to 8.5		$13.54	$4.00	$9.54
90 Count	8.5 to 9.5		$14.71	$4.00	$10.71
80 Count	9.5 to 10.5		$17.02	$4.00	$13.02
70 Count	10.5 to 12.5		$17.62	$4.00	$13.62
60 Count	12.5 to 14		$17.61	$4.00	$13.61
50 Count	14 to 18		$17.06	$4.00	$13.06
10 lb Film Bags					
Non-size A	4 to 7		$9.15	$4.00	$5.15
100 lb Burlap Sacks					
10 oz Min. Size U.S. No. 2		10 to 20	$8.60	$4.00	$4.60
10 oz Min. Size U.S. No. 2	18 to 20		$8.60	$4.00	$4.60
Bulk					
Process-Culls	< 4	< 10	$4.00	$4.00	$0.00
Process-Culls	> 20	> 20	$4.00	$4.00	$0.00

[a]Count = tuber number per 50 lb carton.

[b]18 to 20 oz U.S. No. 1 tubers are typically of marginal value on the fresh market due to their large size. They were therefore priced as U.S. No. 2, 10 oz minimum size.

[c]Sales F.O.B. Shipping Point, market periods 2008-2011 (USDA Federal-State Market News Service 2008-2011). Process-culls priced at regional process-cull market value.

Process Value - Methods

Early Harvest

Economic Potential
The gross return in U.S. dollars per acre for each trial entry was calculated using an early harvest mock processing contract similar to those used by Washington State processors. All assumptions are listed below.

Contract Assumptions:

1. Base price of $160/ton.
   a. Base price is an average of early-harvest Ranger Russet contracts from Washington processors.
2. To compensate for yield loss due to early harvest, the base price was increased by $1.00/ton per day for each day potatoes were harvested earlier than Sept. 1.
3. Early harvest quality parameters were identical to those mentioned below in the Late Harvest Process Value – Methods.

Late Harvest

Economic Potential
The gross return in U.S. dollars per acre for each trial entry was calculated using a late-harvest mock processing contract. Process-market values are based on criteria (below) similar to that used by WA potato processors. Production costs per acre were not applied. Direct delivery contract assumptions are listed below.

Contract Assumptions:
1. **Base price:** $160/ton for market (U.S. #1 & 2) grade tubers.
2. **Six oz clause:** Premiums for market grade tubers 6 oz or greater of $0.80/ton for each percentage point >53% of the total tuber yield composite, with premium maximum not to exceed a total of $12.00/ton. Penalties were $1.00/ton for each percentage point below 53% > 6 oz tubers; below 40% > 6 oz, lots were penalized $20/ton.
3. **US #1 clause:** Premiums for US #1 grade tubers 6 oz or greater of $0.40/ton for each percentage point >60% of the total tuber yield composite, with premium maximum not to exceed a total of $10.00/ton. Penalties were $0.20/ton for each percentage point below 60% > 6 oz US #1 tubers, with the penalty maximum not to exceed a total of $4.20/ton.
4. **Undersized clause:** Market grade potatoes <4 oz (process culls) were valued at $60.00/ton.
5. **Specific Gravity clause:** Premiums per ton were $1.00 at 1.078, $3.00 at 1.079, $5.00 at 1.080, $7.00 at 1.081, $8.00 at 1.082, $9.00 at 1.083, with a maximum of $10.00 for 1.084 through 1.088. Above 1.088 premiums were as follows: $9.00 at 1.089, $8.00 at 1.090, $7.00 at 1.091, $6.00 at 1.092, $5.00 at 1.093, $4.00 at 1.094, $3.00 at 1.095, $2.00 at 1.096, $1.00 at 1.097. $0.00 at 1.098 and $0.00 at 1.099. Above 1.099, lots were penalized $1.00/ton with no ceiling. No premium or penalty for a value of 1.077. Penalties per ton were $5.00 at 1.076, $10.00 at 1.075, and $15.00 at 1.074. Below 1.074, lots were penalized $20.00/ton with no rejection minimum.
6. No premiums or penalties were applied for bruise, tuber fry color, sugar content, or internal defects.

2019 Postharvest Procedures

Early Harvest

Culinary and quality characteristics of clones from the Red/Specialty Trial were evaluated after oven-baking, microwaving and boiling. Four- to six-ounce tubers were selected for the cooking protocols described below. After cooking, each tuber was halved from stem to bud end. One half was immediately tasted and evaluated on a scale from 1 to 5 (5 is best) for texture, flavor, tuber center, and skin characteristics. The remaining half was incubated for 30 minutes at room temperature and after-cooking-darkening was then graded on a 1 to 5 scale based on a color chart for white- and yellow-fleshed clones (1 = excessive graying, 5 = no discoloration).

Oven Baking - Tubers were pierced twice with a fork on each side and baked at 400°F for 1 hour.

Boiling - Tubers were cooked in a sieved double-boiler for 1 hour after coming to a boil.

Microwaving - Tubers were pierced twice with a fork on each side and cooked for 10 minutes at the outer edge of a microwave oven (high setting). The tubers were then turned over and moved to the center of the microwave where they were cooked an additional 10 minutes. Four-tuber samples from each of two clones (eight tubers total) were cooked simultaneously.

Cooking Time – was determined on 0.5-inch x 0.5-inch cores of tuber tissue cut from the stem (2 cores) and bud (2 cores) ends of 4 tubers of each clone. To prepare the cores, a 0.5-inch-thick longitudinal section was removed from the center of each tuber. Two cores were then cut from each end, one from the cortical area just beneath the periderm and one from the center region. The cores were placed in boiling water and timed until a weighted (90-g) pin penetrated the tissue.

Chipping - Tubers were cut longitudinally from stem to bud end. One half was sliced into 0.05-inch thick chips. The first slice was discarded to ensure uniform thickness of the second slice, which was processed as a chip. The chip samples (12 tubers/clone; 1 chip per tuber) were rinsed with water and fried in 375°F vegetable oil for 2 minutes. The chips were drained on paper towels and chip color was graded using the potato chip Snack Food Association (SFA) color chart (1 = light, 5 = dark).

Late Harvest

Testing of clones in the late harvest trials involved the following postharvest quality evaluations. As soon as possible after harvest, tuber specific gravity and fry color (Photovolt readings) were measured on 12 tubers from each clone. Clones designated as fresh processing were French fried and Photovolt readings compared at harvest only. Additional tubers of each clone were placed in storage at 40, 44 and 48°F. Tubers stored at 48°F were evaluated for bruise potential, soft rot susceptibility, consumer acceptance of French fries, and cooking time in October and November. Reducing sugar content and French fry color were assessed in early December. The extent of sprouting was recorded in late December. Tubers stored at 44°F were also evaluated for sugar accumulation in December. Storage of tubers at 40°F until mid December was done to determine the “cold-frying” potential of clones. Fry color was assessed as described below.

Statistical Analysis

Least significant difference (LSD) values are included in the tables to facilitate evaluation of differences in fry color (Photovolt readings), specific gravity, taste panel ratings, bruise, soft rot, and sprouting. Any two means whose difference is greater than or equal to the LSD value are significantly different.

Evaluation of Rated Characteristics

Specific gravity - was measured on a 12-tuber sample from each clone prior to storage by the weight-in-air/weight-in-water method and values were transformed into a 5-point scale as shown below. These same tubers were then used for French fry quality evaluation.

5 = 1.083–1.088

4 = 1.081–1.082 and 1.089–1.091

3 = 1.080 and 1.092–1.093

2 = 1.078–1.079 and 1.094–1.095

1 = 1.076–1.077 and 1.096 or higher

0 = 1.075 or lower

Tuber shape - The lengths and widths of up to twenty five 8- to 10-ounce tubers from each clone were measured and length:width (L/W) ratios reported. This was done to reveal the effects (if any) of growing location on tuber shape and to estimate the yield (% by number) of ≥3-inch long fries for each clone. Fry yields were calculated based on algorithms relating tuber shape (L/W) to the number and weight of fries. The following table reflects these relationships.

Visual Shape	Tuber L/W ratio	Percentage of French Fries (≥3 in.) (by weight)	(by number)
Round	1.00	53.9	35.2
Blocky	1.25	70.3	51.6
	1.50	82.6	64.1
	1.75	90.8	72.8
	2.00	95.0	77.6
Elongated	2.25	95.1	78.5

A L/W ratio close to one indicates a round tuber which is not ideally suited for French fry production. A ratio in the 1.5-1.8 range represents an oblong, blocky tuber, which is more desirable for processing. A typical L/W ratio for Russet Burbank is about 1.80. A schematic illustrating the relative sizes of potatoes having various ratios is included in the postharvest sections for the Tri-State and Regional Trials. Blocky and elongated tubers result in high French fry yield with less waste. Length to width ratios were transformed into a 5-point rating scale as shown below:

5 = 1.8 L/W and above
4 = 1.65-1.79 L/W
3 = 1.5-1.64 L/W
2 = 1.35-1.49 L/W
1 = 1.2-1.34 L/W
0 = Less than 1.2 L/W

French fries - were processed by frying tuber slices (3/8" x 1 1/8" x length of tuber) in 375°F oil for 3.5 minutes. Fry color was measured with a Photovolt meter within 3 minutes of frying. A Photovolt reading of 19 or less was considered unacceptably dark. The stem and bud end Photovolt readings were reported along with the USDA color class (see below). A difference of 9 Photovolt units or more between bud and stem end constitutes non-uniform fry color. A point was either added or subtracted from the total score, based on the uniformity of fry color. A (+) or (-) symbol is included with the Photovolt ratings to indicate that a point has been added or subtracted during tabulation of the total score. The USDA color classes assigned to French fries were based upon Photovolt readings of the darkest ends (usually the stem end) and are for information only; they were not used in determining the final rating.

Photovolt	USDA color
>31	0
25-30	1
20-24	2
15-19	3
<14	4

Rating	Photovolt reading
5 =	41 or higher
4 =	36 thru 40
3 =	31 thru 35
2 =	25 thru 30
1 =	20 thru 24
0 =	19 or less

Taste panels - were used to determine the consumer acceptance of French fries prepared from tubers of each clone. All of the clones evaluated by the taste panels were produced through classical breeding techniques. Slices (3/8" x 3/8" x length of tuber) from tubers stored at 48°F were fried in 375°F oil for 4.5 minutes. Approximately 20 untrained panelists rated the fries on a 1 to 5 (5=best) scale for taste, texture, internal flesh color, and weak units (limpness). The average rating of the four fry characteristics is reported and was used in calculating the total rating score for each clone.

Calculation of Total Score - The overall postharvest rating for each clone is equal to the sum of the individual ratings for each of the following quality characteristics:

Quality Parameter	Maximum Rating*
Fry color prior to storage (0-5 ±1 uniformity)	6**
Specific gravity (0-5)	5
Length to Width Ratio (0-5)	5
Taste panel (avg of 5 pts for taste, texture, internal flesh color and limpness of cooked fries) (1-5)	5
Fry color after 60 days storage at:	
48°F fry color (0-5 ±1 uniformity)	6**
44°F fry color (0-5 ±1 uniformity)	6**
40°F fry color (0-5)	5
Postharvest rating =	38

*All characteristics are rated from 0-5 or 1-5 as indicated. A rating of 5 is best. **Uniformity of color from bud to stem end is also evaluated. The fry color ratings of samples prior to storage and after 60 days at 44 and 48°F will gain or lose a point, depending on uniformity. For example, if the difference between stem and bud end fry color is <9 photovolt reflectance units, indicating highly uniform fry color, a point is added to determine the overall score. On the other hand, if the difference between stem and bud end fry color is ≥9 photovolt reflectance units (non-uniform fry color), a point is subtracted to end up with the final score. Hence, a clone can receive a maximum of 38 points.

Evaluations of Non-Rated Characteristics

Reducing sugars - concentrations in tuber stem and bud ends were determined on a percent dry weight basis. Reducing sugars were assayed spectrophotometrically or were estimated based on fry color in tubers stored at 44° and 48°F.

Bruise potential and severity - For each clone, 12 tubers were warmed to room temperature for one day. Each tuber was then held under a device that dropped a 4-ounce weight from a height of 23 inches. Each tuber received four such impacts, two on the stem end and two on the bud end. After 24 hours, the tubers were peeled and the percentage of impacts resulting in a blackspot or shatter bruise was calculated. In addition, the severity of bruise was also rated on a 1-5 scale as indicated below. Bruises that rated 3, 4, or 5 were used in the overall percentage calculation.

Bruise Severity Ratings:

1 = No bruise
2 = White Knot bruise
3 = Less than 50% of the impact area darkened
4 = Greater than 50% of the impact area darkened, or the whole impact area is light brown
5 = 100% of the impact area is dark

Soft rot index - Bacterial soft rot susceptibility was determined by wounding the stem and bud ends of room-temperature tubers, inoculating the wounds with *Pectobacterium carotovorum* subsp. *carotovorum*, and incubating the tubers (6 tubers per clone) for 24 hours at 72°F in a mist chamber. The percentage fresh weight of tissue lost due to rot is reported.

Reconditioning potential - Reconditioning ability of tubers stored at 40°F for approximately 60 days was determined by subsequently storing the tubers at 60°F for 21 days. The change in fry color over the reconditioning interval provides a relative measure of the reconditioning potential for each clone.

Sprouting - The degree of sprout development in tubers stored at 40 and 48°F was assessed after all other tests had been completed (usually late December). The percentage of tubers that sprouted and the average sprout length per tuber were recorded for 15 tubers of each clone.

Long-term Storage Characteristics of Clones in the 2018 Tri-State and Regional Variety Trials

For evaluation of long-term storability, tubers were held at 48°F until late December and then transferred to 44°F. The tubers were processed into French fries, and reducing sugars were measured in late April or early May of the following year. Tubers were not reconditioned prior to frying. Results from clones that were advanced from the Tri-State to the Regional Trial are reported in the Regional Trial section.

2019 Early Harvest Tri-State Trial

Location: WSU Research Center – Othello, WA
Planting Date: April 4 Vine Kill Date: July 22
Harvest Date: August 5 Days Grown: 109

The Tri-State trial is conducted annually in Washington, Idaho, and Oregon. The Tri-State committee designates which clones are entered in the trial. Selected cultivars and clones in the early trial are grown and managed for an early harvest (July/Aug). The 2018 trial compared 4 local reference varieties to 8 new clones. The following is a summary of the Washington field and post-harvest results. See also: grading comments and merit scores near front of book

Fresh Market Standout(s): AOR08540-1
Process Market Standout(s): AOR11217-3, AOR08540-1

Yield and Economic Data

- **Total Yield and U.S. #1 Yield**
  Highest: A07098-4 had the highest total yield (550 CWT/A) and the U.S. #1 yield (478 CWT/A). OR12133-10 had the second highest total yield (536 CWT/A); and AOR10204-3 had the second highest U.S. #1 yield (478 CWT/A).

  Lowest: A09022-4 had the lowest total yield (386 CWT/A) and the U.S. #1 yield (319 CWT/A). A08422-4VRsto had the second lowest total yield (418 CWT/A); and Ranger Russet had the second lowest U.S. #1 yield (378 CWT/A).

- **% U.S. #1's (greater than 4 oz)**
  Highest: A08422-4VRsto (95%) and A07547-4adg (92%).
  Lowest: A07705-4 (77%); A09022-4 (82%) and A08510-1LB (83%).

- **Carton Yield (100 to 50 Count (7 to 18 oz U.S. #1 Tubers))**
  Highest: OR12133-10 (15.5 Tons/A), AOR10204-3 and A08422-4VRsto (14.9 Tons/A).
  Lowest: A07705-4 (6.0 Tons/A).

- **Gross Return ($/acre)**
  Fresh Market Highest: A07098-4 and OR12133-10.
  Fresh Market Lowest: A07705-4, A09022-4, and A08510-1LB.
  Process Market Highest: A07098-4, OR12133-10, and A07545-4adg.

For detailed information see the Early Harvest Tri-State Summary tables on the next few pages.

2019 Early Harvest Tri-State Trial

Summaries

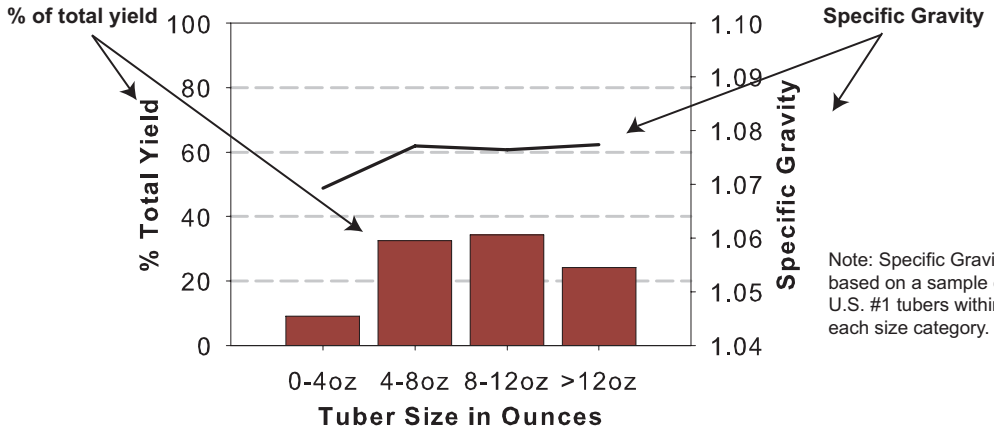
ENTRY	TOTAL YIELD			US # 1's* > 4 oz	US # 2's* > 4 oz	Culls* & < 4 oz	CARTON YIELD 100-50 count (US 1's 7-18 oz)		PROCESS YIELD US 1's and 2's > 6 oz	
	CWT/A	STATS**	Tons/A	% of Total Yield			% of Total Yield	Tons/A	% of Total Yield	Tons/A
Ranger Russet	702	*AB*	35.1	86	4	10	61	21.2	76	26.8
Russet Burbank	742	*AB*	37.1	83	5	12	59	21.7	73	26.9
Russet Norkotah	631	*B*	31.5	84	2	15	51	16.1	65	20.5
Shepody	751	*AB*	37.5	82	9	9	47	17.7	83	31.4
A09022-4	646	*B*	32.3	85	1	14	50	16.1	66	21.4
A10007-3	640	*B*	32.0	90	1	9	42	13.6	88	28.3
A10595-13sto	710	*AB*	35.5	86	11	3	58	20.5	93	33.0
A11194-1	695	*AB*	34.7	88	1	10	60	20.8	78	27.0
AOR08540-1	789	*A*	39.4	91	3	6	66	25.9	82	32.5
AOR10204-3	749	*AB*	37.4	87	9	4	71	26.6	88	33.0
AOR11217-3	710	*AB*	35.5	89	5	5	62	22.1	79	28.0
COA11013-2	662	*AB*	33.1	75	9	17	44	14.5	65	21.3

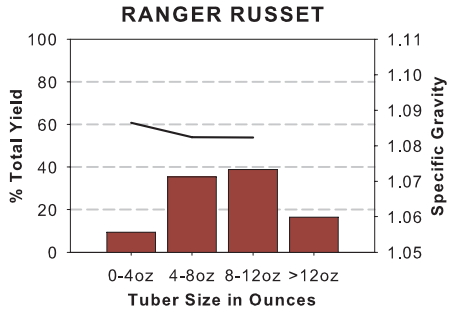
ENTRY	US # 1 YIELD						> 4 oz SPECIFIC GRAVITY	INTERNAL DEFECTS (%) (8-12 oz tubers)		
	> 4 oz CWT/A	STATS**	> 4 oz Tons/A	4-7 oz*	7-14 oz*	> 14 oz*		% HH	% BC	% IBS
				%						
Ranger Russet	606	*AB*	30.3	27	63	9	1.082	0	0	0
Russet Burbank	617	*AB*	30.8	28	62	10	1.082	0	3	0
Russet Norkotah	527	*B*	26.3	39	58	3	1.074	0	0	0
Shepody	615	*AB*	30.8	14	37	49	1.077	0	0	0
A09022-4	550	*B*	27.5	42	56	2	1.084	0	0	0
A10007-3	580	*AB*	29.0	6	29	65	1.069	0	0	0
A10595-13sto	607	*AB*	30.4	6	45	50	1.079	0	0	0
A11194-1	613	*AB*	30.6	25	57	19	1.079	0	0	0
AOR08540-1	718	*A*	35.9	21	60	18	1.076	0	0	0
AOR10204-3	653	*AB*	32.7	15	72	13	1.076	0	0	0
AOR11217-3	634	*AB*	31.7	30	64	6	1.085	0	0	0
COA11013-2	496	*B*	24.8	39	56	4	1.080	0	0	3

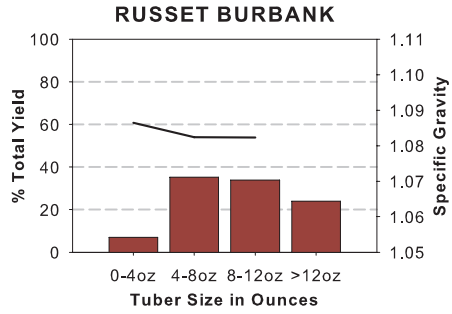
ENTRY	30 DAY STAND	40 DAY STAND	50 DAY STAND	STEMS PER PLANT	AVERAGE TUBER WEIGHT	AVERAGE TUBER NUMBER	SKIN SET 1 = Poor 5 = Good	TUBER SHAPE 1 = Round 5 = Long	BRUISE (%) (8-12 oz tubers)	
	% Emerged	% Emerged	% Emerged	Above Ground	Ounces	Tubers/Plant			BLACKSPOT	SHATTER
Ranger Russet	53	100	100	2.3	7.4	10.0	4	3	17	3
Russet Burbank	62	93	100	2.2	7.9	9.8	3	3	10	3
Russet Norkotah	60	98	100	3.1	6.3	10.3	5	4	3	3
Shepody	51	98	98	2.6	9.9	7.9	4	3	0	0
A09022-4	13	93	98	2.6	6.6	10.2	4	2	0	47
A10007-3	20	89	98	1.7	13.8	4.8	4	4	7	24
A10595-13sto	24	96	98	2.5	12.2	6.1	4	3	23	10
A11194-1	36	98	98	3.0	7.6	9.5	4	2	3	27
AOR08540-1	16	100	100	2.7	8.7	9.4	3	4	3	7
AOR10204-3	9	93	96	3.0	9.0	8.7	2	3	0	3
AOR11217-3	20	89	93	2.6	8.0	9.3	3	3	3	14
COA11013-2	36	84	89	3.2	6.4	10.8	3	3	0	7

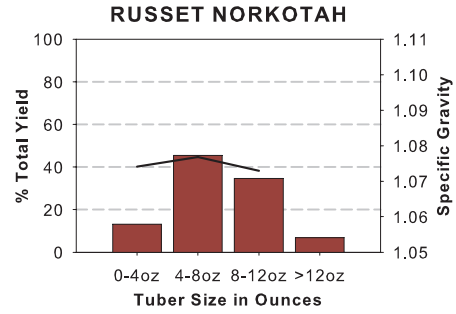
2019 Early Harvest Tri-State Trial

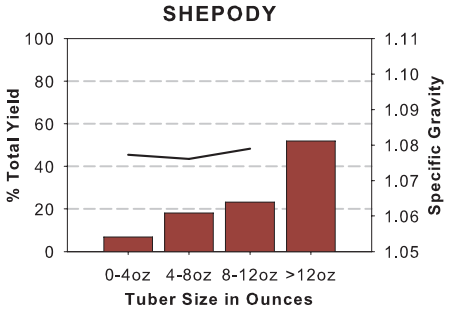
Tuber Yield and Specific Gravity Distributions
In-Row Spacing = 12 inches
Row Width = 32 inches

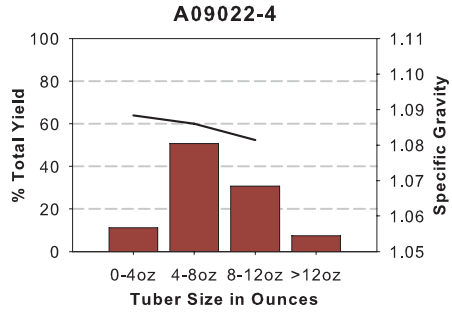


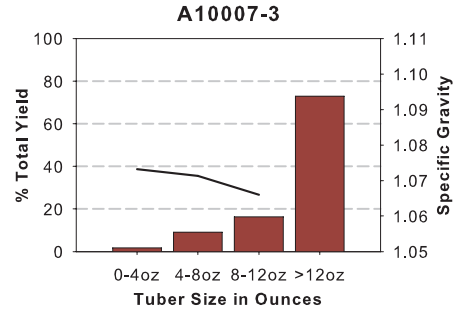


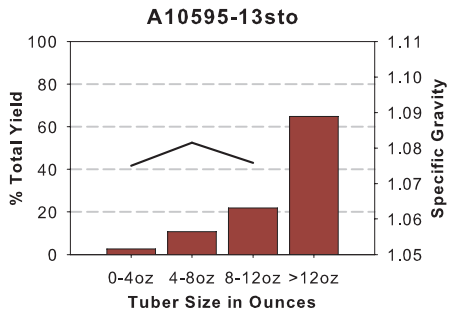


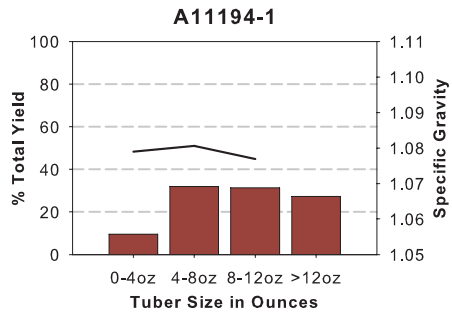


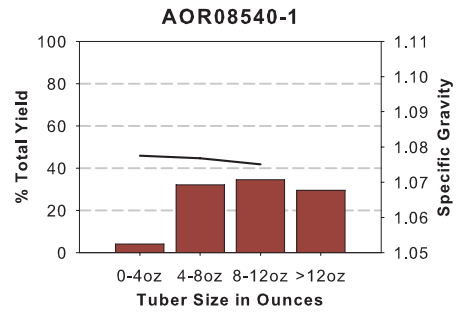


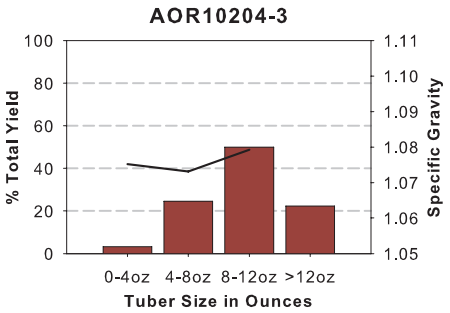


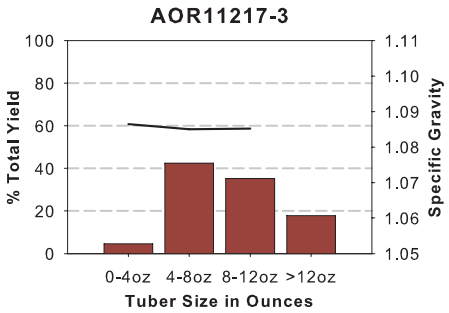


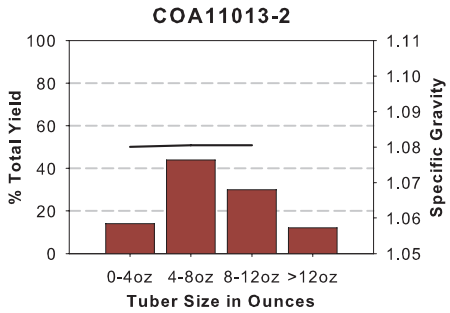







AOR10204-3
% Total Yield
Specific Gravity
100
80
60
40
20
0
1.11
1.10
1.09
1.08
1.07
1.06
1.05
0-4oz
4-8oz
8-12oz
>12oz
Tuber Size in Ounces


AOR11217-3
% Total Yield
Specific Gravity
100
80
60
40
20
0
1.11
1.10
1.09
1.08
1.07
1.06
1.05
0-4oz
4-8oz
8-12oz
>12oz
Tuber Size in Ounces


COA11013-2
% Total Yield
Specific Gravity
100
80
60
40
20
0
1.11
1.10
1.09
1.08
1.07
1.06
1.05
0-4oz
4-8oz
8-12oz
>12oz
Tuber Size in Ounces

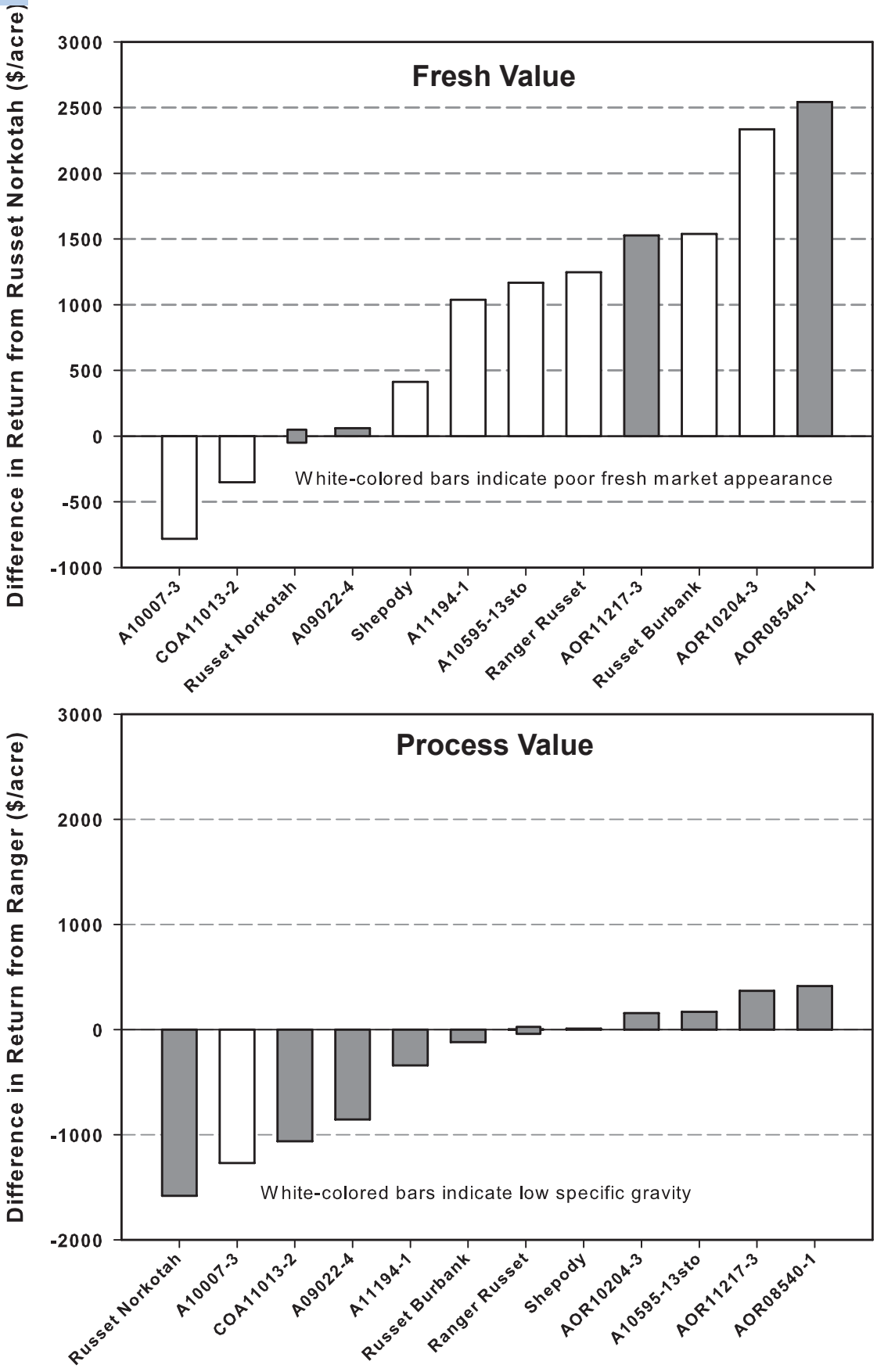


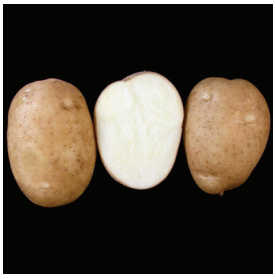
Figure 1 (Top). Difference in gross return per acre (Fresh Market) from Russet Norkotah calculated by subtracting the gross return of Russet Norkotah from the gross return of the particular entry. **Figure 2 (Bottom)**. Difference in gross return per acre (Process Market) from Ranger Russet calculated by subtracting the gross return of Ranger Russet from the gross return of the particular entry. Entries with the white-colored bars would be penalized due to a low specific gravity.

2019 Early Harvest Tri-State Trial

Tubers

Ranger Russet

A09022-4



AOR08540-1

COA11013-2

Russet Burbank

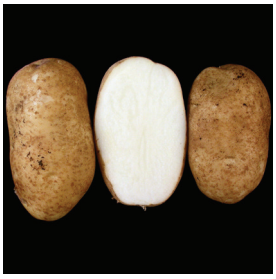
A10007-3

AOR10204-3

A11194-1

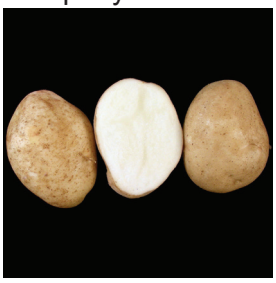
Russet Norkotah

A10595-13sto



AOR11217-3

Shepody



2019 Late Harvest Tri-State Trial

Location: WSU Research Center – Othello, WA
Planting Date: April 3 Vine Kill Date: August 29
Harvest Date: September 9 Days Grown: 148

The Tri-State trial is a part of the cooperative cultivar development program conducted at locations in Washington, Oregon, and Idaho. The Tri-State committee selects all official entries in this trial. All entries are grown for full season late harvest in each of the three states to determine how they perform when grown under different management and climatic conditions. The following is a summary of the Washington field and post harvest results. See also: grading comments and merit scores near front of book.

Fresh Market Standout(s): AOR11217-3
Process Market Standout(s): AOR11217-3

Yield and Economic Data

- **Total and US #1**
  Highest: AOR08540-1 had the highest total yield (1044 CWT/A). AOR10204-3 had the second highest total yield (1016 CWT/A) and the second highest US #1 yield (834 CWT/A).
  Lowest: Russet Norkotah had the lowest total yield (658 CWT/A) and Russet Burbank had the lowest US #1 yield (565 CWT/A).

- **% U.S. #1's Greater Than 4 oz.**
  Highest: AOR11217-3 (91%), A11194-1 (88%).
  Lowest: Russet Burbank (75%) and AOR08540-1 (77%).

- **Carton Yield (100 to 50 Count (7 to 18 oz US #1 Tubers))**
  Highest: AOR11217-3 (29.5 Tons/A), A09022-4 (29.0 Tons/A).
  Lowest: A10007-3 (10.4 Tons/A) and A10595-13sto (17.0 Tons/A).

- **Gross Return ($/acre)**
  Fresh Market Highest: A09022-4, AOR11217-3, and A11194-1.
  Fresh Market Lowest: A10007-3, A10595-13sto, and Russet Norkotah.
  Process Market Highest: AOR11217-3 and AOR08540-1.
  Process Market Lowest: Russet Norkotah, COA11013-2, and Russet Burbank.

For detailed information see the Late Harvest Tri-State Summary tables on the next few pages.

2019 Late Harvest Tri-State Trial

Summaries

ENTRY	TOTAL YIELD			US # 1's* > 4 oz	US # 2's* > 4 oz	Culls* & < 4 oz	CARTON YIELD 100-50 count (US 1's 7-18 oz)		PROCESS YIELD US 1's and 2's > 6 oz	
	CWT/A	STATS**	Tons/A	% of Total Yield			% of Total Yield	Tons/A	% of Total Yield	Tons/A
Ranger Russet	863	*AB*	43.2	84	9	7	49	21.3	89	38.4
Russet Burbank	870	*AB*	43.5	75	10	15	46	20.2	79	34.6
Russet Norkotah	658	*B*	32.9	85	5	10	57	18.8	78	26.2
A09022-4	954	*A*	47.7	85	3	13	61	29.0	78	37.0
A10007-3	973	*A*	48.6	81	7	13	21	10.4	85	41.4
A10595-13sto	900	*AB*	45.0	83	7	10	38	17.0	87	39.2
A11194-1	932	*AB*	46.6	88	4	8	58	26.8	84	39.2
AOR08540-1	1044	*A*	52.2	77	9	14	44	23.2	82	42.5
AOR10204-3	1016	*A*	50.8	82	6	12	43	22.0	84	42.7
AOR11217-3	938	*AB*	46.9	91	1	7	63	29.5	84	39.6
COA11013-2	945	*AB*	47.2	81	4	16	53	25.1	76	36.4

ENTRY	US # 1 YIELD						> 4 oz SPECIFIC GRAVITY	INTERNAL DEFECTS (%) (8-12 oz tubers)		
	> 4 oz CWT/A	STATS**	> 4 oz Tons/A	4-7 oz*	7-14 oz*	> 14 oz*		% HH	% BC	% IBS
				%						
Ranger Russet	727	*AB*	36.3	8	41	51	1.080	0	0	0
Russet Burbank	656	*AB*	32.8	13	42	45	1.077	3	0	5
Russet Norkotah	565	*B*	28.2	20	50	30	1.063	0	0	0
A09022-4	808	*AB*	40.4	18	57	25	1.078	0	0	0
A10007-3	784	*AB*	39.2	5	14	81	1.059	0	0	0
A10595-13sto	745	*AB*	37.2	6	25	70	1.071	0	0	0
A11194-1	815	*AB*	40.7	13	47	40	1.071	0	0	0
AOR08540-1	802	*AB*	40.1	10	40	50	1.080	3	0	0
AOR10204-3	834	*AB*	41.7	7	26	67	1.072	0	0	0
AOR11217-3	859	*AB*	42.9	15	50	35	1.082	0	0	0
COA11013-2	764	*AB*	38.2	15	48	37	1.072	0	0	15

ENTRY	30 DAY STAND	40 DAY STAND	60 DAY STAND	STEMS PER PLANT	AVERAGE TUBER WEIGHT	AVERAGE TUBER NUMBER	SKIN SET 1 = Poor 5 = Good	TUBER SHAPE 1 = Round 5 = Long	BRUISE (%) (8-12 oz tubers)	
	% Emerged	% Emerged	% Emerged	Above Ground	Ounces	Tubers/Plant			BLACKSPOT	SHATTER
Ranger Russet	0	64	96	1.7	11.8	7.0	4	4	32	30
Russet Burbank	0	35	93	1.9	10.3	8.1	4	4	11	42
Russet Norkotah	0	51	100	1.8	8.7	7.2	4	4	0	29
A09022-4	0	24	97	2.4	8.9	10.2	4	3	3	69
A10007-3	0	18	93	1.6	15.2	6.1	4	3	0	42
A10595-13sto	0	29	99	1.4	14.0	6.2	4	3	16	35
A11194-1	0	63	97	2.6	10.1	8.8	4	3	15	50
AOR08540-1	0	50	97	2.3	11.0	9.1	4	3	5	46
AOR10204-3	0	38	96	2.2	13.4	7.2	3	3	3	59
AOR11217-3	0	46	99	1.9	9.4	9.5	4	3	8	49
COA11013-2	0	64	96	2.2	9.1	9.9	4	4	6	48

2019 Late Harvest Tri-State Trial

Postharvest Information

Samples were obtained from the Washington, Idaho and Oregon field adaptation trials for analysis in Pullman. Six numbered entries and two cultivars were tested from ID, WA and OR. Overall postharvest performance ratings of the clones compared with Russet Burbank appear in the tables on pages 31 & 40. Details are summarized below. An "*" in the summary below indicates similar performance and/or ranking in trials from previous years.

- **Overall Postharvest Rating**
  Highest scoring clones: A09022-4*, AOR11217-3
  Lowest scoring clones: A10007-3, RB*
- **Low Temperature Sweetening**
  Most resistant: A09022-4*, A10595-13sto
  Most susceptible: A10007-3, RB*
- **French Fry Taste Panel**
  Highest rated: AOR11217-3, A11194-1
  Lowest rated: A10007-3, RB*
- **Blackspot Bruise Susceptibility**
  Most resistant: COA11013-2, A09022-4
  Most susceptible: A10595-13sto, RR*
- **Variability in Tuber Shape & Fry Yield (8- to 10-oz tubers)**
  Lowest L/W: A09022-4, A11194-1, A10595-13sto
  Highest L/W: RB*, RR*, COA11013-2
  Least variable: COA11013-2
  Most variable: A10595-13sto

Details

- A09022-4* and AOR11217-3 were the highest rated entries, scoring 32.1 and 30.9 out of 38 points, respectively.

- A09022-4* and A10595-13sto were resistant to cold sweetening, with tuber samples from all states producing acceptably light colored fries following storage for 60 d at 44 or 40°F (USDA 0 at 44°F, USDA 0 or 1 at 40°F, average of stem ends).

- For the WA trial, 4/8 entries stored at 48°F and 5/8 entries stored at 44°F produced non-uniform fry color (bud to stem end photovolt difference ≥9). For the OR trial, 4/8 entries stored at 44°F produced non-uniform fry color. The top rated entries (A09022-4, AOR11217-3) maintained uniform fry color regardless of production site (WA, ID, OR) and storage temperature (48, 44, 40°F).

- Retention of process quality during storage of A10007-3, RR, and A11194-1 at 44°F was highly variable across production sites. By contrast, growing location had the least effect on the change in fry color of A09022-4 and COA11013-2 following 60 days at 44°F.

- A10007-3 and RB* received the lowest overall postharvest scores.

- Average (across states) gravities of A10007-3, A11194-1, COA11013-2, and A10595-13sto were 1.062, 1.070, 1.071, and 1.074, respectively; too low for frozen process contracts. The gravities of the other entries ranged from 1.075 to 1.084 when averaged across states. When averaged across the 8 entries, gravities were 1.068 (OR), 1.080 (ID), and 1.076 (WA).

- AOR11217-3 and A11194-1 were the favorites in the taste panels, scoring 3.9/5 on average when averaged across growing locations (5 is best). A10007-3 and RB* received the lowest taste panel score of 2.9 on average.

- In addition to rating overall bruise susceptibility, blackspot bruise severity was rated from 1 to 5 (max. bruise) based on color intensity and percentage of the impacted area showing color (1= no bruise, 2= white knot bruise, 3= less than 50% of impact area with color, 4= >50% of impact area darkened or whole area light brown, 5= full impact area dark). A10595-13sto and RR* were the most susceptible, scoring 88 and 86% bruise (stem end), respectively, in the controlled impact study. These entries also had the highest bruise severity, averaging 3.5/5. COA11013-2 and A09022-4 were the most resistant, averaging 6 and 11% bruise (stem end), respectively, and 1.2 severity rating.

- The 8- to 10-oz tubers of A09022-4, A11194-1, and A10595-13sto had the lowest length to width ratios (avg. L/W=1.71 across states), which is relatively high compared to an average of 1.36 for the roundest entries in last year's trial. The range in L/W ratios was 1.54 (A10595-13sto from WA) to 2.46 (RR from ID). Averaged across states, yields of 3-inch or longer French fries ranged from 87 to 94% by tuber fresh weight. A10595-13sto had the greatest variation in L/W ratio; usable fry yields ranged from 85 to 93% across production sites.

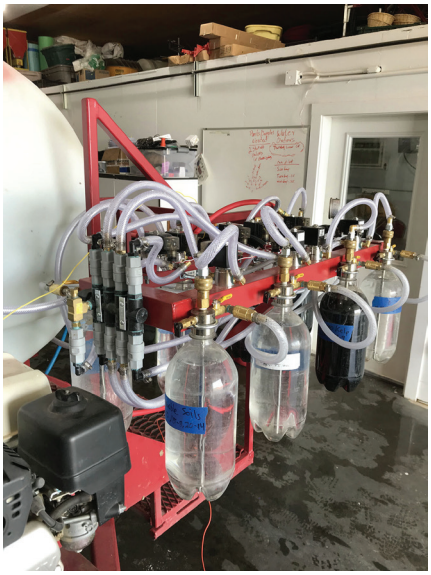
- Reconditioning (60°F, 21 days) tubers of A09022-4, COA11013-2, and RR that had been stored at 40°F for 60 days resulted in the greatest improvement in stem-end fry color compared with the other clones. By contrast, fry color of A11194-1, and A10595-13sto changed little in response to reconditioning. A11194-1, A10595-13sto, and AOR11217-3 appeared more susceptible to sugar end development based on attenuated reconditioning of the stem versus bud end of tubers following storage at 40°F.

- Following 60 days of storage at 48°F, 65% of COA11013-2 tubers were sprouting with an average sprout length of 2.4 inches. On average, 58% of tubers of A11194-1 had sprout lengths of 0.75 inches and 67% of tubers of A09022-4 had sprout lengths of 0.58 inches. This compares with 51% of RR tubers with 0.25-inch-long sprouts and no sprouting from RB tubers.

Overall Tri-State Postharvest Merit Scores

Clone	Postharvest Merit Scores WA	ID	OR	3 state Average
3 A09022-4	4.2	4.7	3.8	4.2
7 AOR11217-3	3.9	4.4	4.0	4.1
5 A10595-13sto	3.2	4.1	3.6	3.6
8 COA11013-2	3.6	3.7	3.5	3.6
1 Ranger Russet	3.2	3.5	3.5	3.4
6 A11194-1	2.2	3.8	2.7	2.9
2 Russet Burbank	2.6	2.7	1.9	2.4
4 A10007-3	1.7	2.2	1.5	1.8

2019 Non-Traditional Additives Trial



2019 Non-Traditional Additive Trial: Graduate students Colton Thurgood and Francisco Gonzalez have been testing the efficacy of non-traditional additives over the past several years. Most are NOT a wise investment.

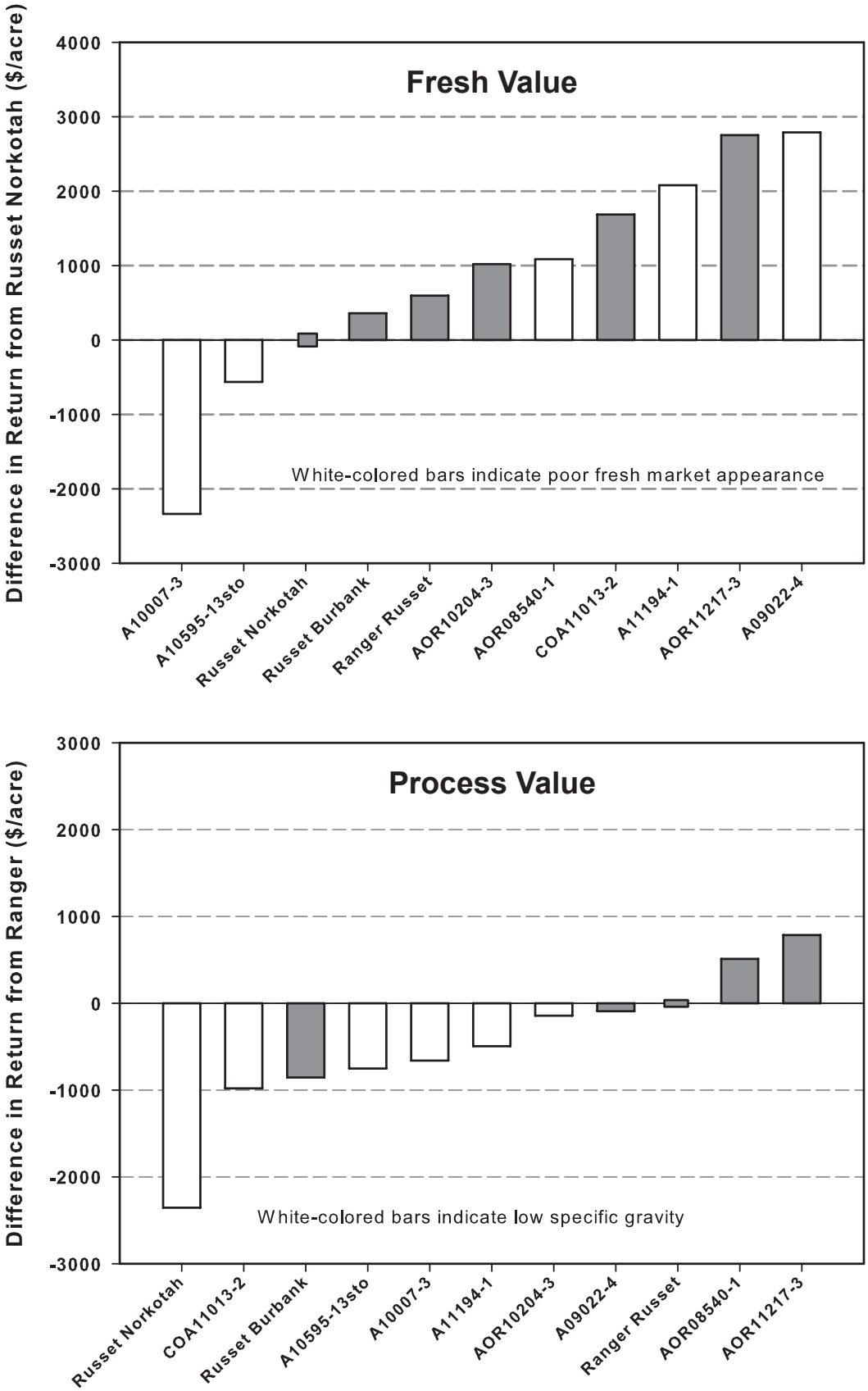
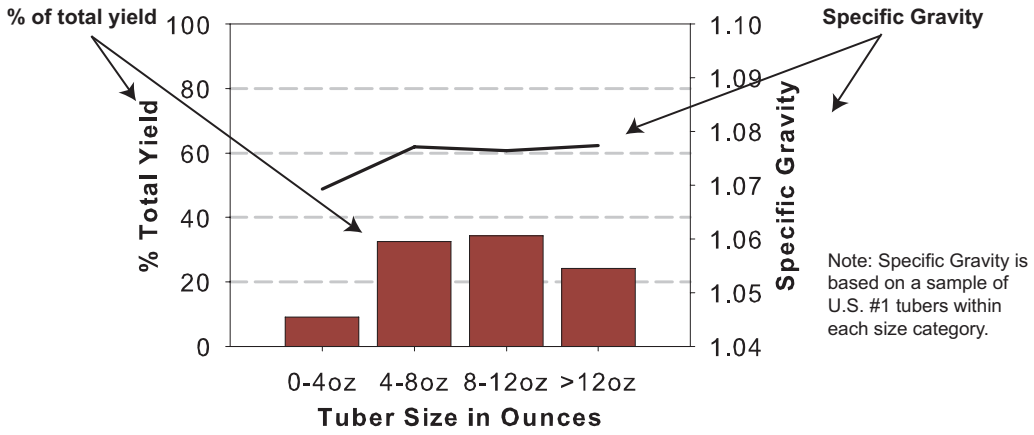
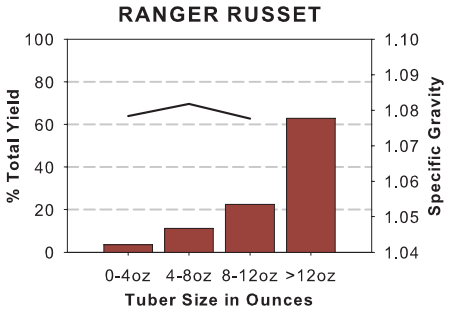


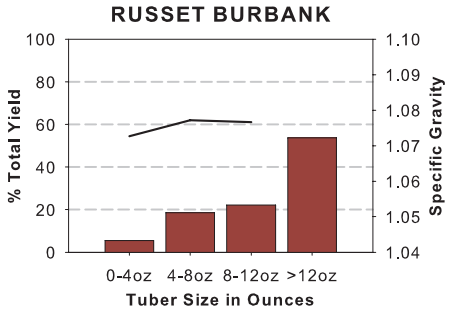
Figure 1 (Top). Difference in gross return per acre (Fresh Market) from Russet Norkotah calculated by subtracting the gross return of Russet Norkotah from the gross return of the particular entry. Entries with the white-colored bars may not appeal to fresh market consumers due to undesirable shape or appearance. **Figure 2 (Bottom).** Difference in gross return per acre (Process Market) from Ranger Russet calculated by subtracting the gross return of Ranger Russet from the gross return of the particular entry. Entries with the white-colored bars would be penalized (under the mock contract parameters) due to a specific gravity less than 1.075.

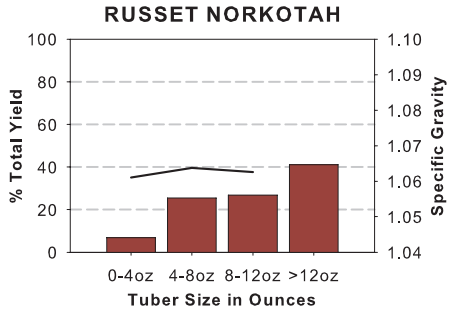
2019 Late Harvest Tri-State Trial

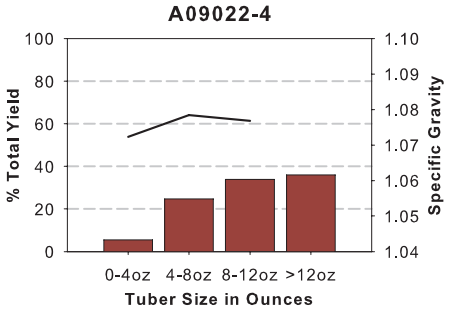
Tuber Yield and Specific Gravity Distributions
In-Row Spacing = 11 inches
Row Width = 32 inches

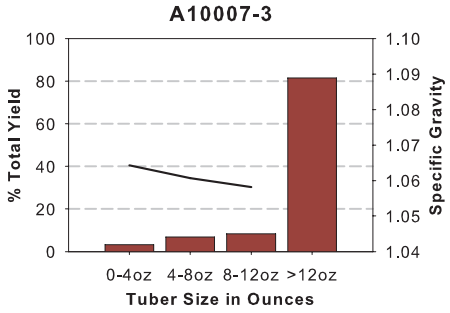


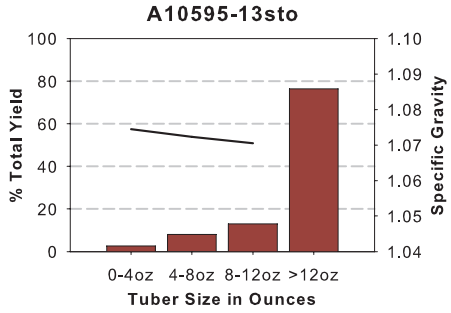


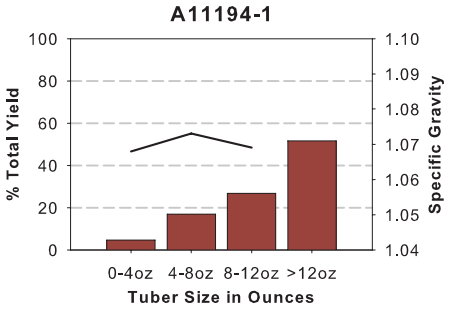


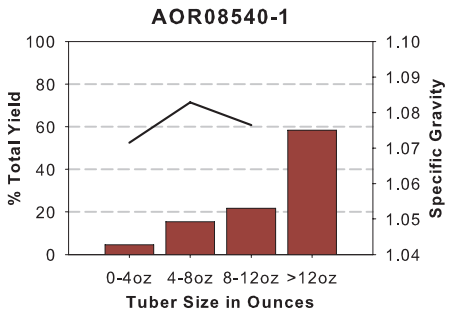


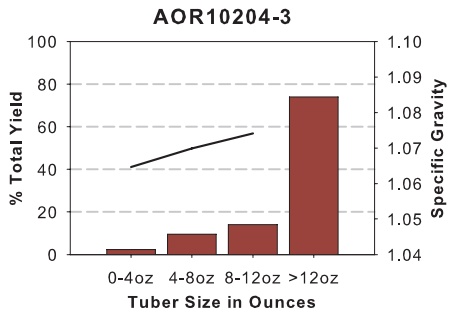


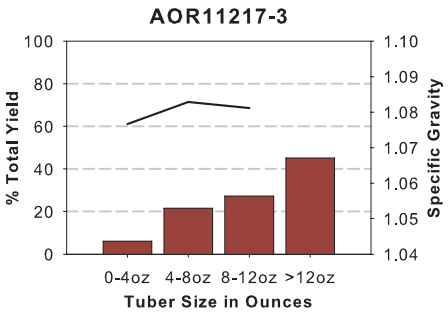


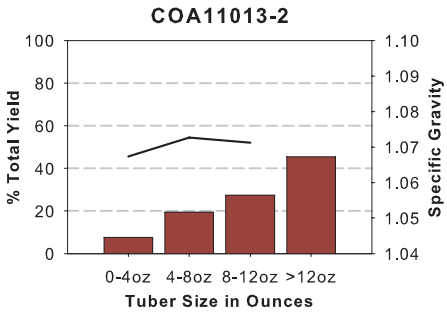




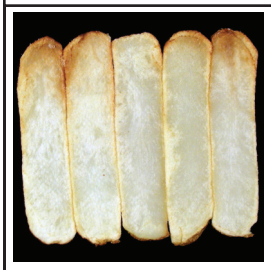
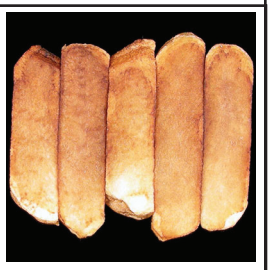
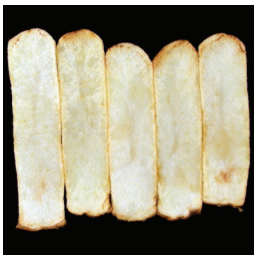
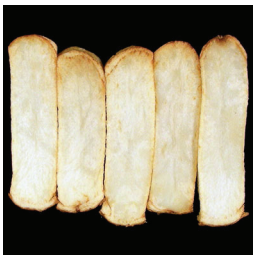
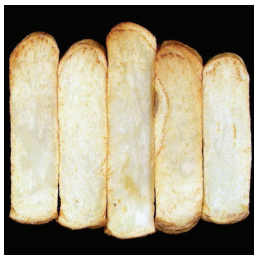
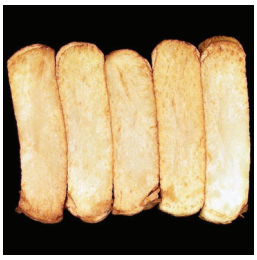
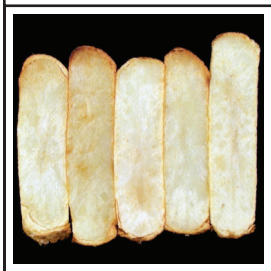
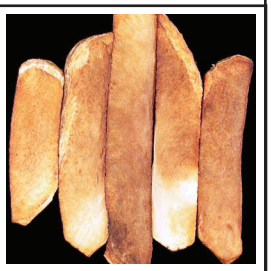
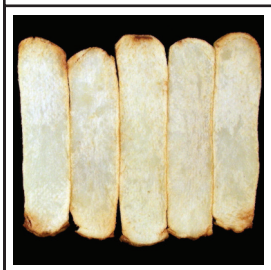
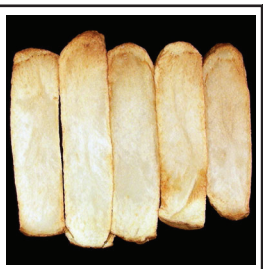
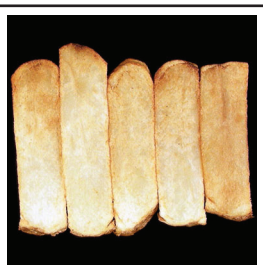
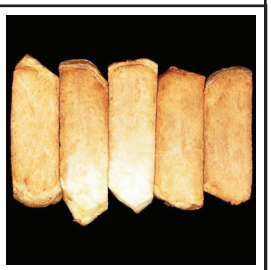


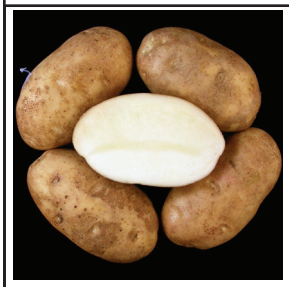
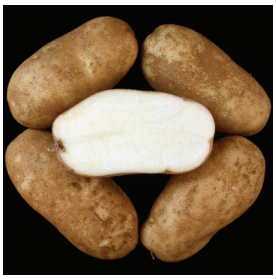


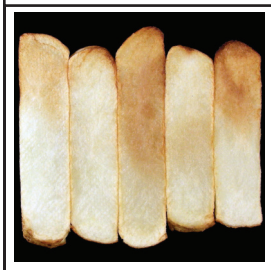
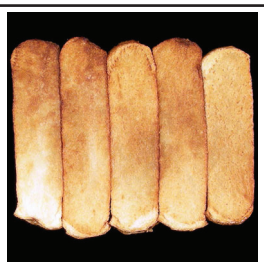
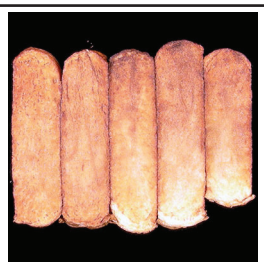
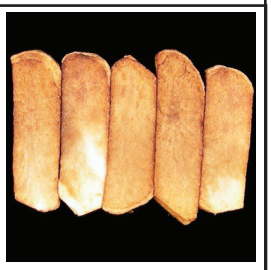
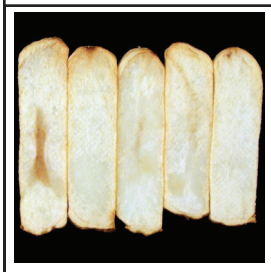
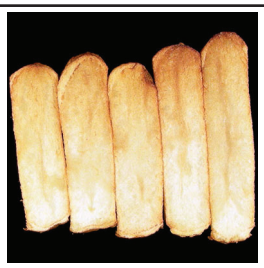
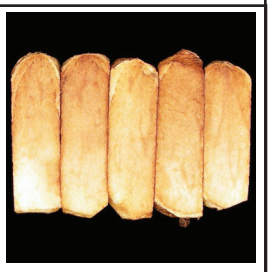

AOR11217-3
% Total Yield
Specific Gravity
100
80
60
40
20
0
1.10
1.09
1.08
1.07
1.06
1.05
1.04
0-4oz
4-8oz
8-12oz
>12oz
Tuber Size in Ounces


COA11013-2
% Total Yield
Specific Gravity
100
80
60
40
20
0
1.10
1.09
1.08
1.07
1.06
1.05
1.04
0-4oz
4-8oz
8-12oz
>12oz
Tuber Size in Ounces

Tubers	WA Late Harvest Tri-State Trial Comments
Ranger Russet	
	**Tubers:** Oblong to long tubers. Good skin set; moderate eye depth. **Fry color:** At harvest= light, uniform; 48°F = light, non-uniform; 44°F = light, non-uniform; 40°F = relatively dark, non-uniform; Reconditioned = relatively dark, non-uniform.
Russet Burbank	
	**Tubers:** Oblong to long tubers. Good skin set; moderate eye depth. **Fry color:** At harvest= light, uniform; 48°F = relatively dark, non-uniform; 44°F = relatively dark, non-uniform; 40°F = unacceptably dark, uniform; Reconditioned = unacceptably dark, uniform.
A09022-4	
	**Tubers:** Oblong tubers. Good skin set; shallow eyes. **Fry color:** At harvest= light, uniform; 48°F = light, uniform; 44°F = light, uniform; 40°F = light, uniform; Reconditioned = light, uniform.
A10007-3	
	**Tubers:** Oblong tubers. Good skin set; moderate eye depth. **Fry color:** At harvest= light, uniform; 48°F = relatively dark, non-uniform; 44°F = unacceptably dark,non-uniform; 40°F = unacceptably dark, uniform; Reconditioned = relatively dark, non-uniform.
A10595-13sto	
	**Tubers:** Oblong tubers. Good skin set; moderately deep eyes. **Fry color:** At harvest= light, uniform; 48°F = light, uniform; 44°F = light, uniform; 40°F = relatively dark, uniform; Reconditioned = relatively dark, uniform.

Initial Fries	48º F Storage	44º F Storage	40º F Storage	40º F Recon.
Ranger Russet				
				
Russet Burbank				
				
A09022-4				
				
A10007-3				
				
A10595-13sto				
				

Tubers	WA Late Harvest Tri-State Trial Comments
A11194-1	
	**Tubers:** Oblong tubers. Good skin set; moderate eye depth. **Fry color:** At harvest= light, uniform; 48°F = light, non-uniform; 44°F = relatively dark, non-uniform; 40°F = unnaceptably dark, uniform; Reconditioned = relatively dark, uniform.
AOR11217-3	
	**Tubers:** Oblong tubers. Good skin set; shallow eyes. **Fry color:** At harvest= light, uniform; 48°F = light, uniform; 44°F = light, non-uniform; 40°F = relatively dark, uniform; Reconditioned = light, non-uniform.
COA11013-2	
	**Tubers:** Oblong to long tubers. Good skin set; shallow eyes. **Fry color:** At harvest= light, uniform; 48°F = light, uniform; 44°F = light, uniform; 40°F = relatively dark, non-uniform; Reconditioned = light, uniform.

Initial Fries	48º F Storage	44º F Storage	40º F Storage	40º F Recon.
A11194-1				
				
AOR11217-3				
				
COA11013-2				
				

2019 Late Harvest Tri-State Trial

Accumulated Total Postharvest Rating of Clones

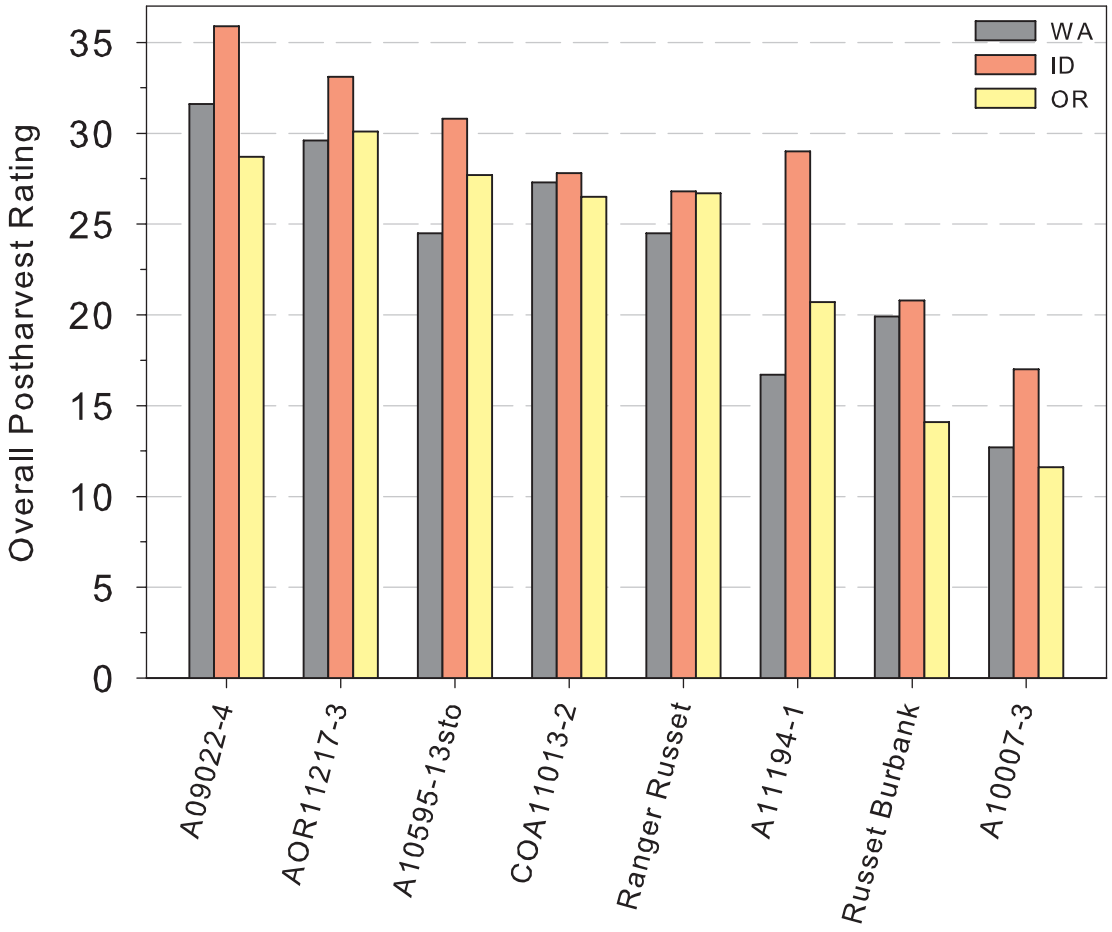
Clone	WA Rating Total §	WA Discard §§	ID Rating Total §	ID Discard §§	OR Rating Total §	OR Discard §§	3 State av. Rating Total
3 A09022-4	31.6		35.9		28.7	SG	32.1
7 AOR11217-3	29.6		33.1		30.1		30.9
5 A10595-13sto	24.5	SG	30.8		27.7	SG	27.7
8 COA11013-2	27.3		27.8		26.5	SG	27.2
1 Ranger Russet	24.5		26.8		26.7		26.0
6 A11194-1	16.7	SG, 40°F	29.0		20.7	SG	22.1
2 Russet Burbank	19.9	40°F	20.8	SG	14.1	SG, 40°F	18.3
4 A10007-3	12.7	SG, 44,40°F	17.0	SG, 40°F	11.6	SG, 40°F	13.8
	23.4		27.7		23.3		24.8

§ maximum rating possible = 38
§§ Values for the indicated evaluation are lower than the rejection level.

The 2019 Seed Size Trial: Clearwater Russet was used to show the effects that seed size has on plant growth and yield.

2019 Late Harvest Tri-State Trial

Late Harvest Tri-State Postharvest Ratings



2019 Late Harvest Tri-State Trial

Entries Retained from the 2018 Trials Currently in the Tri-State Trial

Harvested fall of 2018
Held at 48° F until December 15, 2018
Stored at 44° F until analysis

Only one clone (A09022-4) was retained from the 2018 Tri-State Trial into the 2019 Trial. When averaged across states, A09022-4 produced the lightest fries (51.4 ref units). The uniformity of fry color was unacceptable for RB and Ranger grown in all states. A09022-4 produced fries with low stem to bud color differences regardless of production site, which is highly desirable. Sprout lengths ranged from 0.13 to 0.75 inches, with A09022-4 producing the longest sprouts relative to the check cultivars.

	PHOTOVOLT READING				USDA	% REDUCING SUGAR			Sprouting	
Clone	stem	bud	avg	DIFF	COLOR	stem	bud	avg	percent	length (in.)
Washington										
1 Ranger Russet	25.3	41.1	33.2	15.8	1	1.9	0.7	1.3	100	0.25
2 Russet Burbank	26.2	41.7	34.0	15.5	1	1.8	0.7	1.2	100	0.13
3 A09022-4	48.1	48.6	48.3	2.9	0	0.5	0.5	0.5	100	0.50
		LSD 0.05	*3.0*	*4.5*						
Average	33.2	43.8	38.5	11.4	0.7	1.4	0.6	1.0	100	
Idaho										
1 Ranger Russet	35.0	45.8	40.4	10.8	0	1.0	0.6	0.8	100	0.50
2 Russet Burbank	27.5	47.7	37.6	20.3	1	1.7	0.5	1.1	100	0.13
3 A09022-4	56.1	54.1	55.1	3.7	0	0.5	0.5	0.5	100	0.75
		LSD 0.05	3.3	*4.4*						
Average	39.5	49.2	44.4	11.6	0.3	1.0	0.5	0.8	100	
Oregon										
1 Ranger Russet	32.9	46.5	39.7	13.6	0	1.1	0.5	0.8	100	0.50
2 Russet Burbank	27.0	49.7	38.4	22.7	1	1.7	0.5	1.1	100	0.13
3 A09022-4	47.3	54.2	50.8	7.5	0	0.5	0.5	0.5	100	0.75
		LSD 0.05	*4.1*	*4.2*						
Average	35.7	50.1	42.9	14.6	0.3	1.1	0.5	0.8	100	

Date test performed:

Washington	April 29
Idaho	April 29
Oregon	April 29

2019 Late Harvest Tri-State Trial
Prior to Storage

Clone	PHOTOVOLT READING stem	bud	av	rtg §	DIFF	USDA COLOR	SPECIFIC GRAVITY	rtg
Washington								
1 Ranger Russet	53.7	54.3	54.0	**5+**	3.9	0	1.079	**2**
2 Russet Burbank	46.5	50.7	48.6	**5+**	5.9	0	1.081	**4**
3 A09022-4	57.4	54.9	56.2	**5+**	3.1	0	1.080	**3**
4 A10007-3	44.6	49.2	46.4	**5+**	6.4	0	1.061	**0**
5 A10595-13sto	53.1	50.8	51.9	**5+**	3.7	0	1.072	**0**
6 A11194-1	49.2	53.1	51.2	**5+**	6.1	0	1.070	**0**
7 AOR11217-3	55.5	56.1	55.8	**5+**	4.5	0	1.087	**5**
8 COA11013-2	44.2	49.6	46.9	**5+**	6.3	0	1.076	**1**
		LSD 0.05	*2.9*		*ns*		*0.005*	
Average	50.5	52.3	51.4		5.0	0	1.076	
Idaho								
1 Ranger Russet	38.1	39.3	38.7	**4+**	7.3	0	1.086	**5**
2 Russet Burbank	42.7	43.4	43.0	**5+**	4.9	0	1.075	**0**
3 A09022-4	59.4	52.6	56.0	**5+**	6.8	0	1.083	**5**
4 A10007-3	35.2	35.7	35.3	**3+**	5.2	0	1.070	**0**
5 A10595-13sto	45.3	38.8	42.1	**5+**	8.3	0	1.079	**2**
6 A11194-1	44.9	41.5	43.2	**5+**	7.9	0	1.079	**2**
7 AOR11217-3	59.3	56.7	58.0	**5+**	3.2	0	1.088	**5**
8 COA11013-2	52.8	51.9	52.3	**5+**	3.4	0	1.077	**1**
		LSD 0.05	*3.5*		*3.4*		*0.004*	
Average	47.2	45.0	46.1		5.9	0	1.080	
Oregon								
1 Ranger Russet	48.9	48.2	48.6	**5+**	3.4	0	1.078	**2**
2 Russet Burbank	33.8	46.9	40.4	**4-**	13.1	0	1.070	**0**
3 A09022-4	55.2	53.7	54.5	**5+**	3.2	0	1.069	**0**
4 A10007-3	21.4	32.1	25.7	**2-**	12.7	2	1.055	**0**
5 A10595-13sto	44.3	48.0	46.2	**5+**	3.9	0	1.070	**0**
6 A11194-1	49.9	53.2	51.6	**5+**	5.0	0	1.062	**0**
7 AOR11217-3	50.8	54.9	52.8	**5+**	5.3	0	1.077	**1**
8 COA11013-2	47.5	49.5	48.5	**5+**	3.3	0	1.061	**0**
		LSD 0.05	*2.9*		*3.5*		*0.004*	
Average	44.0	48.3	46.0		6.2	0	1.068	

Date test performed:

Washington	Sept. 13	Sept. 12
Idaho	Sept. 24	Sept. 23
Oregon	Sept. 30	Sept. 25

§ rtg = rating (1-5, 5 is best); av = average Photovolt reading; Diff = Absolute difference between stem and bud Photovolt reading. Stem to bud differences of nine or greater (-) lose one point and differences of less than nine (+) gain one point in the accumulated total postharvest rating.

2019 Late Harvest Tri-State Trial

Stored at 48°F after Arrival

Clone	FRENCH FRY TASTE PANEL rating	BRUISE POTENTIAL (percent) stem	bud	[color 5=darkest] stem	bud	SOFT ROT INDEX (percent) stem	bud
Washington							
1 Ranger Russet	**3.5**	96	13	3.8	1.3	19	16
2 Russet Burbank	**2.9**	75	8	3.2	1.2	23	32
3 A09022-4	**3.6**	4	0	1.1	1.0	11	12
4 A10007-3	**2.7**	67	4	2.7	1.1	19	21
5 A10595-13sto	**3.5**	83	8	3.2	1.2	13	22
6 A11194-1	**3.7**	25	0	1.5	1.0	19	16
7 AOR11217-3	**3.6**	29	8	1.8	1.2	15	18
8 COA11013-2	**3.3**	0	0	1.0	1.0	24	32
LSD 0.05	*0.4*	*26*	*ns*			*6*	*12*
Average	3.3	47.4	5.2	2.3	1.1	17.7	21.1
Idaho							
1 Ranger Russet	**3.8**	71	4	2.7	1.1	18	21
2 Russet Burbank	**2.8**	33	4	1.7	1.1	18	17
3 A09022-4	**3.9**	17	4	1.4	1.1	15	15
4 A10007-3	**3.0**	54	0	2.4	1.0	17	17
5 A10595-13sto	**3.8**	88	4	3.8	1.1	11	13
6 A11194-1	**4.0**	46	8	2.0	1.2	13	14
7 AOR11217-3	**4.1**	42	25	2.0	1.5	11	13
8 COA11013-2	**3.8**	4	0	1.1	1.0	20	22
LSD 0.05	*0.3*	*30*	*14*			*5*	*8*
Average	3.6	44.3	6.3	2.1	1.1	15.4	16.7
Oregon							
1 Ranger Russet	**3.7**	92	8	3.8	1.2	14	18
2 Russet Burbank	**3.1**	75	8	3.2	1.2	16	17
3 A09022-4	**3.7**	13	13	1.3	1.3	12	10
4 A10007-3	**2.6**	46	13	2.2	1.3	13	14
5 A10595-13sto	**3.7**	92	13	3.5	1.3	12	9
6 A11194-1	**3.7**	46	8	2.1	1.2	15	13
7 AOR11217-3	**4.1**	50	17	2.3	1.4	10	10
8 COA11013-2	**3.5**	13	4	1.3	1.1	13	13
LSD 0.05	*0.3*	*29*	*ns*			*4*	*5*
Average	3.5	53.1	10.4	2.4	1.2	13.2	12.9

Date test performed:

Washington	Oct. 8	Oct. 18	Nov. 6
Idaho	Oct. 9	Oct. 23	Nov. 13
Oregon	Oct. 10	Oct. 30	Nov. 20

2019 Late Harvest Tri-State Trial

Stored at 48°F for 60 Days

	PHOTOVOLT READING				DIFF	USDA	% REDUCING SUGAR		SPROUTING	
Clone	stem	bud	average	rtg §		COLOR	stem	bud	(%)	length (in)
Washington										
1 Ranger Russet	36.1	46.9	41.5	**5-**	11.6	0	0.9	0.5	60	0.25
2 Russet Burbank	19.3	40.5	29.9	**2-**	21.2	3	2.8	0.7	0	
3 A09022-4	48.8	49.7	49.2	**5+**	4.2	0	0.5	0.5	100	0.75
4 A10007-3	17.8	31.8	24.1	**1-**	14.3	3	3.1	1.2	0	
5 A10595-13sto	41.4	48.0	44.7	**5+**	7.9	0	0.7	0.5	7	0.13
6 A11194-1	28.2	42.1	35.1	**3-**	13.9	1	1.6	0.7	80	1.00
7 AOR11217-3	46.2	51.0	48.6	**5+**	7.1	0	0.5	0.5	47	0.75
8 COA11013-2	35.9	43.4	39.7	**4+**	8.0	0	0.9	0.6	80	2.00
		LSD 0.05	*2.8*		*4.9*				*21*	
Average	34.2	44.1	39.1		11.0	1	1.4	0.7	47	
Idaho										
1 Ranger Russet	28.7	38.8	33.7	**3-**	10.2	1	1.5	0.8	0	
2 Russet Burbank	33.8	44.7	39.2	**4-**	11.3	0	1.1	0.6	0	
3 A09022-4	52.2	50.0	51.1	**5+**	3.2	0	0.5	0.5	0	
4 A10007-3	28.8	37.4	32.9	**3-**	9.4	1	1.5	0.9	0	
5 A10595-13sto	44.3	41.8	43.1	**5+**	5.2	0	0.6	0.7	0	
6 A11194-1	40.0	42.4	41.2	**5+**	4.0	0	0.7	0.6	0	
7 AOR11217-3	51.6	49.7	50.7	**5+**	4.4	0	0.5	0.5	0	
8 COA11013-2	43.4	43.3	43.4	**5+**	5.9	0	0.6	0.6	13	0.13
		LSD 0.05	*3.5*		*3.8*				*9*	
Average	40.3	43.5	41.9		6.7	0	0.9	0.6	2	
Oregon										
1 Ranger Russet	36.4	38.8	37.6	**4+**	6.0	0	0.9	0.8	93	0.50
2 Russet Burbank	24.6	36.7	30.6	**3-**	12.1	1	2.0	0.9	0	
3 A09022-4	48.2	46.8	47.5	**5+**	2.5	0	0.5	0.5	100	1.00
4 A10007-3	25.5	30.7	27.9	**2+**	8.5	1	1.9	1.3	38	0.50
5 A10595-13sto	44.5	45.8	45.2	**5+**	3.0	0	0.6	0.6	7	0.13
6 A11194-1	42.4	41.9	42.1	**5+**	2.9	0	0.6	0.7	93	1.25
7 AOR11217-3	48.1	50.4	49.2	**5+**	4.7	0	0.5	0.5	67	0.25
8 COA11013-2	43.0	45.3	44.1	**5+**	4.1	0	0.6	0.6	100	5.00
		LSD 0.05	*3.9*		*3.4*				*18*	
Average	39.1	42.0	40.5		5.5	0	1.0	0.7	62	

Date test performed:

Washington	Dec. 2	Dec. 2	Dec. 11
Idaho	Dec. 3	Dec. 3	Dec. 12
Oregon	Dec. 8	Dec. 8	Dec. 13

§ rtg = rating (1-5, 5 is best); av = average Photovolt reading; Diff = Absolute difference between stem and bud Photovolt reading. Stem to bud differences of nine or greater (-) lose one point and differences of less than nine (+) gain one point in the accumulated total post-harvest rating.

2019 Late Harvest Tri-State Trial

Stored at 44°F for 60 Days

Clone	PHOTOVOLT READING stem	bud	average	rtg §	DIFF	USDA COLOR	% REDUCING SUGAR stem	bud
Washington								
1 Ranger Russet	28.6	37.8	33.2	**3-**	9.2	1	1.5	0.8
2 Russet Burbank	17.3	35.1	26.2	**2-**	17.8	3	3.1	1.0
3 A09022-4	48.9	49.2	49.1	**5+**	4.1	0	0.5	0.5
4 A10007-3	12.3	26.1	19.2	**0**	14.0	4	4.4	1.8
5 A10595-13sto	32.8	37.6	35.2	**3+**	6.0	0	1.2	0.8
6 A11194-1	22.9	35.1	29.0	**2-**	12.4	2	2.2	1.0
7 AOR11217-3	32.5	44.2	38.4	**4-**	11.7	0	1.2	0.6
8 COA11013-2	34.6	42.4	38.5	**4+**	7.8	0	1.0	0.6
		LSD 0.05	*2.8*		*4.8*			
Average	28.7	38.4	33.6		10.4	1	1.9	0.9
Idaho								
1 Ranger Russet	36.9	41.0	39.0	**4+**	4.8	0	0.9	0.7
2 Russet Burbank	28.4	32.3	30.4	**2+**	4.9	1	1.5	1.2
3 A09022-4	49.7	47.2	48.4	**5+**	4.6	0	0.5	0.5
4 A10007-3	22.3	28.4	25.2	**2+**	7.6	2	2.3	1.6
5 A10595-13sto	43.7	38.0	40.8	**5+**	6.1	0	0.6	0.8
6 A11194-1	36.5	41.2	38.8	**4+**	6.5	0	0.9	0.7
7 AOR11217-3	43.5	45.6	44.5	**5+**	5.6	0	0.6	0.6
8 COA11013-2	38.4	40.2	39.3	**4+**	4.5	0	0.8	0.7
		LSD 0.05	*4.1*		*2.9*			
Average	37.4	39.2	38.3		5.6	0	1.0	0.8
Oregon								
1 Ranger Russet	37.5	44.8	41.1	**5-**	9.3	0	0.8	0.6
2 Russet Burbank	20.4	33.3	26.8	**2-**	12.9	2	2.6	1.1
3 A09022-4	45.3	46.7	46.0	**5+**	2.6	0	0.6	0.5
4 A10007-3	15.9	27.1	21.2	**1-**	12.6	3	3.4	1.7
5 A10595-13sto	36.0	39.0	37.5	**4+**	3.8	0	0.9	0.8
6 A11194-1	23.6	35.4	29.5	**2-**	11.8	2	2.1	1.0
7 AOR11217-3	39.1	43.9	41.5	**5+**	7.1	0	0.8	0.6
8 COA11013-2	37.9	39.9	38.9	**4+**	4.5	0	0.8	0.7
			4.0		4.1			
Average	32.0	38.7	35.3		8.1	1	1.5	0.9

Date test performed:

Washington	Dec. 2	Dec. 2
Idaho	Dec. 4	Dec. 4
Oregon	Dec. 9	Dec. 9

§ rtg = rating (1-5, 5 is best); av = average Photovolt reading; Diff = Absolute difference between stem and bud Photovolt reading. Stem to bud differences of nine or greater (-) lose one point and differences of less than nine (+) gain one point in the accumulated total postharvest rating.

2019 Late Harvest Tri-State Trial

Stored at 40°F for 60 Days and Reconditioned

Clone	SPROUTING (%)	PHOTOVOLT (60 days at 40°F) stem	bud	average	rtg §	DIFF	USDA COLOR	PHOTOVOLT AFTER RECONDITIONING (21 days at 60°F) stem	bud	average	DIFF	USDA COLOR
Washington												
1 Ranger Russet	0	20.2	29.7	24.9	**2**	9.5	2	20.8	33.7	27.3	12.9	2
2 Russet Burbank	0	11.6	19.8	15.7	**0**	8.2	4	14.5	21.0	17.7	6.8	3
3 A09022-4	7	33.9	37.6	35.7	**4**	4.7	0	38.9	43.2	41.1	5.1	0
4 A10007-3	0	13.2	19.1	16.1	**0**	5.7	4	16.1	26.7	21.4	11.8	3
5 A10595-13sto	0	25.5	28.4	26.9	**2**	3.6	1	26.6	32.8	29.7	6.8	1
6 A11194-1	0	16.3	20.2	18.3	**0**	4.3	3	17.7	25.6	21.7	8.0	3
7 AOR11217-3	0	21.3	29.4	25.3	**2**	8.2	2	24.6	37.4	31.0	12.8	1
8 COA11013-2	7	21.7	33.2	27.4	**2**	11.5	2	27.0	35.6	31.3	8.9	1
LSD 0.05	*ns*			*2.6*		*3.8*				*3.5*	*3.9*	
Average	2	20.5	27.2	23.8		7.0	2	23.3	32.0	27.6	9.1	2
Idaho												
1 Ranger Russet	0	18.2	26.3	22.3	**1**	8.1	3	29.1	36.9	33.0	8.6	1
2 Russet Burbank	0	17.3	21.7	19.5	**1**	4.5	3	19.9	27.3	23.6	8.3	2
3 A09022-4	0	42.2	41.6	41.9	**5**	3.3	0	50.0	50.6	50.3	2.2	0
4 A10007-3	0	12.8	20.3	16.4	**0**	7.4	4	16.1	18.6	17.4	3.8	3
5 A10595-13sto	0	26.0	25.1	25.5	**2**	4.7	1	34.4	35.8	35.1	4.2	0
6 A11194-1	0	17.2	23.1	20.1	**1**	5.9	3	18.8	29.2	24.0	10.6	3
7 AOR11217-3	0	20.9	20.9	20.9	**1**	2.1	2	24.2	26.7	25.4	4.2	2
8 COA11013-2	0	21.5	26.4	23.9	**1**	5.5	2	29.1	34.9	32.0	5.8	1
LSD 0.05	*ns*			*2.7*		*2.9*				*3.7*	*4.1*	
Average	0	22.0	25.7	23.8		5.2	2	27.7	32.5	30.1	5.9	2
Oregon												
1 Ranger Russet	0	16.2	27.2	21.7	**1**	11.0	3	21.1	39.0	30.0	17.9	2
2 Russet Burbank	0	12.1	18.8	15.5	**0**	6.7	4	16.2	26.5	21.3	10.2	3
3 A09022-4	7	33.3	33.1	33.2	**3**	3.4	0	43.7	44.9	44.3	2.8	0
4 A10007-3	0	11.7	16.4	14.1	**0**	5.1	4	13.1	17.8	15.4	4.8	4
5 A10595-13sto	0	25.5	31.3	28.4	**2**	5.9	1	21.2	33.2	27.2	12.0	2
6 A11194-1	0	19.0	21.1	20.0	**1**	3.3	3	14.5	24.0	19.2	9.5	3
7 AOR11217-3	0	21.0	28.3	24.6	**2**	8.2	2	27.1	40.4	33.8	13.3	1
8 COA11013-2	40	21.1	25.5	23.3	**1**	5.6	2	25.4	30.0	27.7	6.1	1
LSD 0.05	*14*			*3.3*		*2.9*				*3.4*	*3.6*	
Average	6	20.0	25.2	22.6		6.1	2	22.8	32.0	27.4	9.6	2

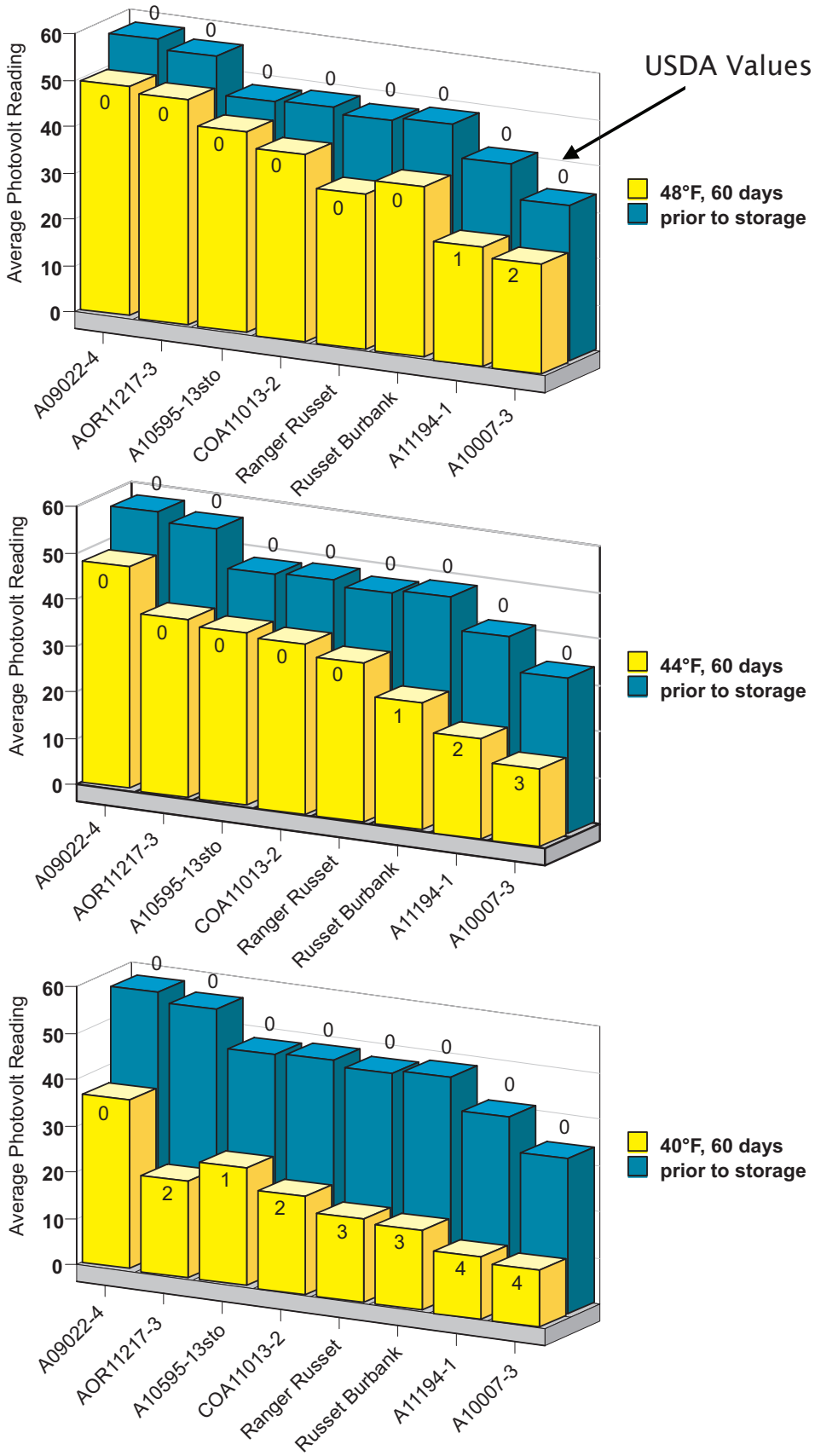
Date test performed:

Washington	Dec. 9	Dec. 3	Dec. 11
Idaho	Dec. 9	Dec. 4	Dec. 12
Oregon	Dec. 9	Dec. 9	Dec. 12

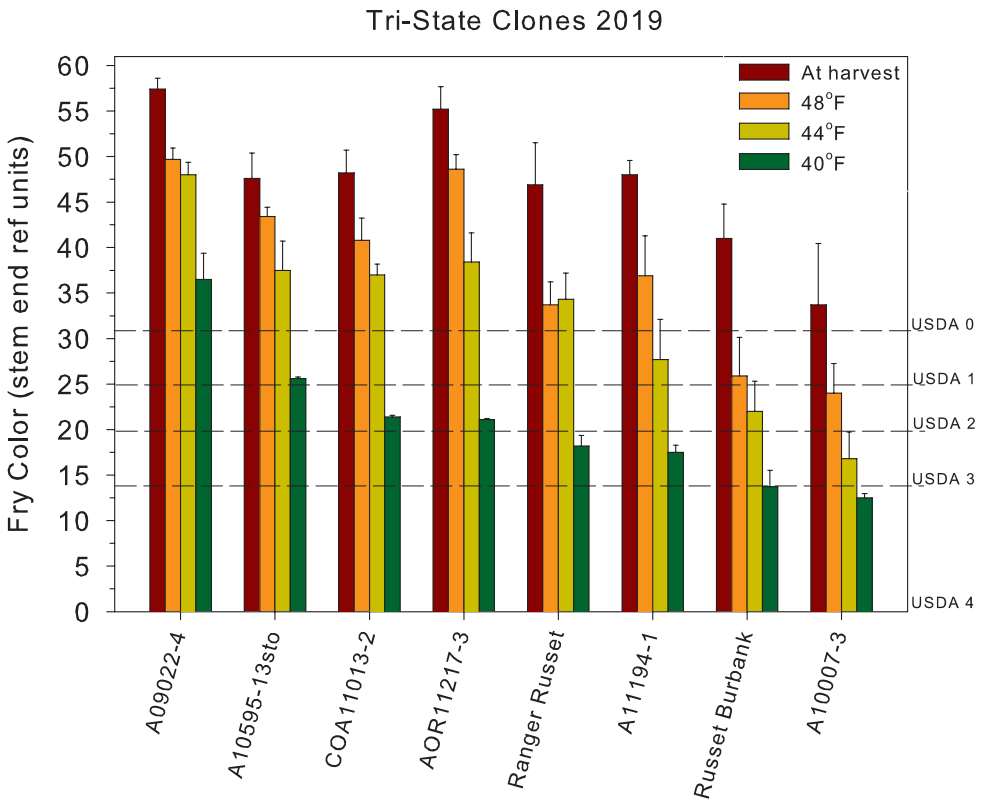
DIFF = Absolute difference between bud and stem Photovolt reading.

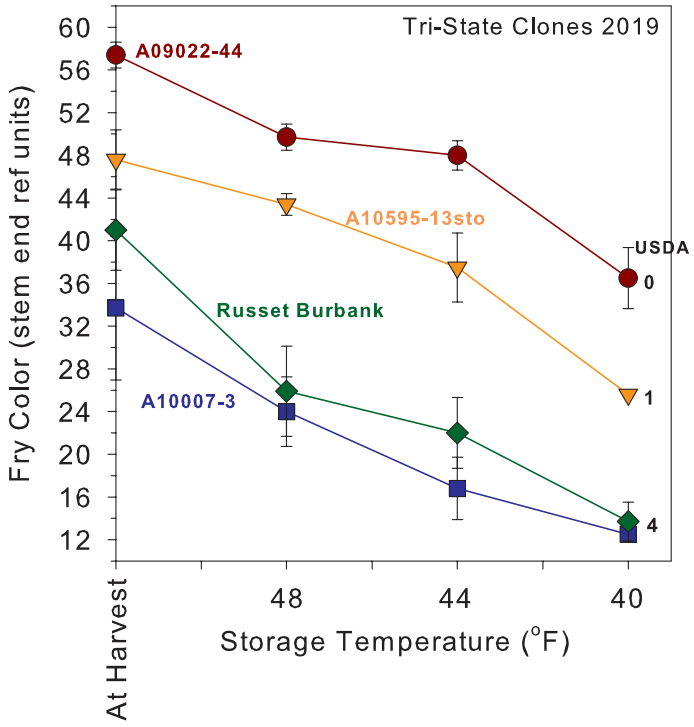
2019 Late Harvest Tri-State Trial

Tri-State Trial - 3 State Average of Stem End



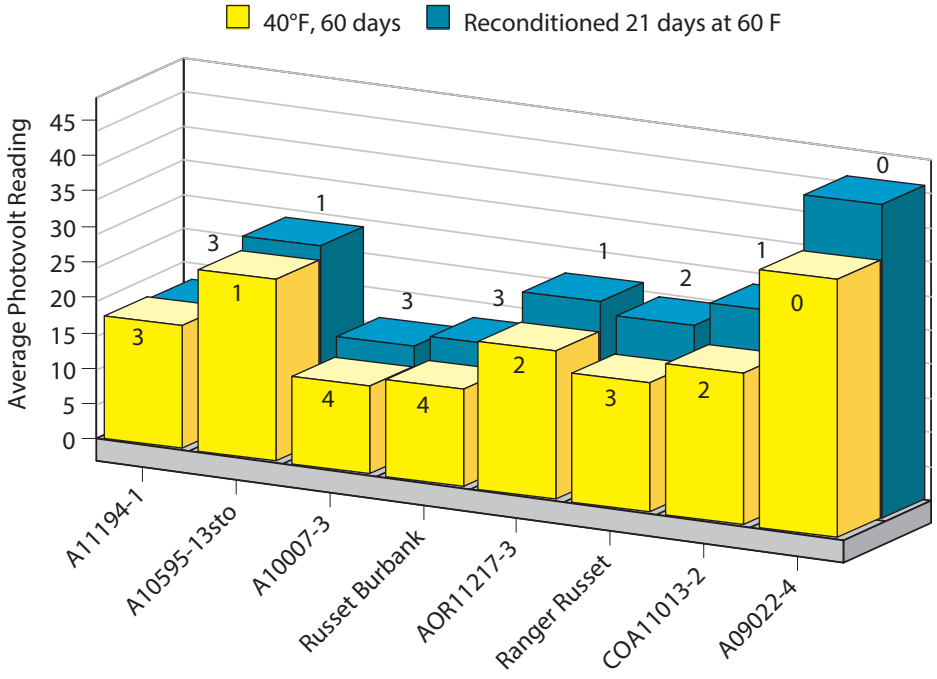
2019 Late Harvest Tri-State Trial

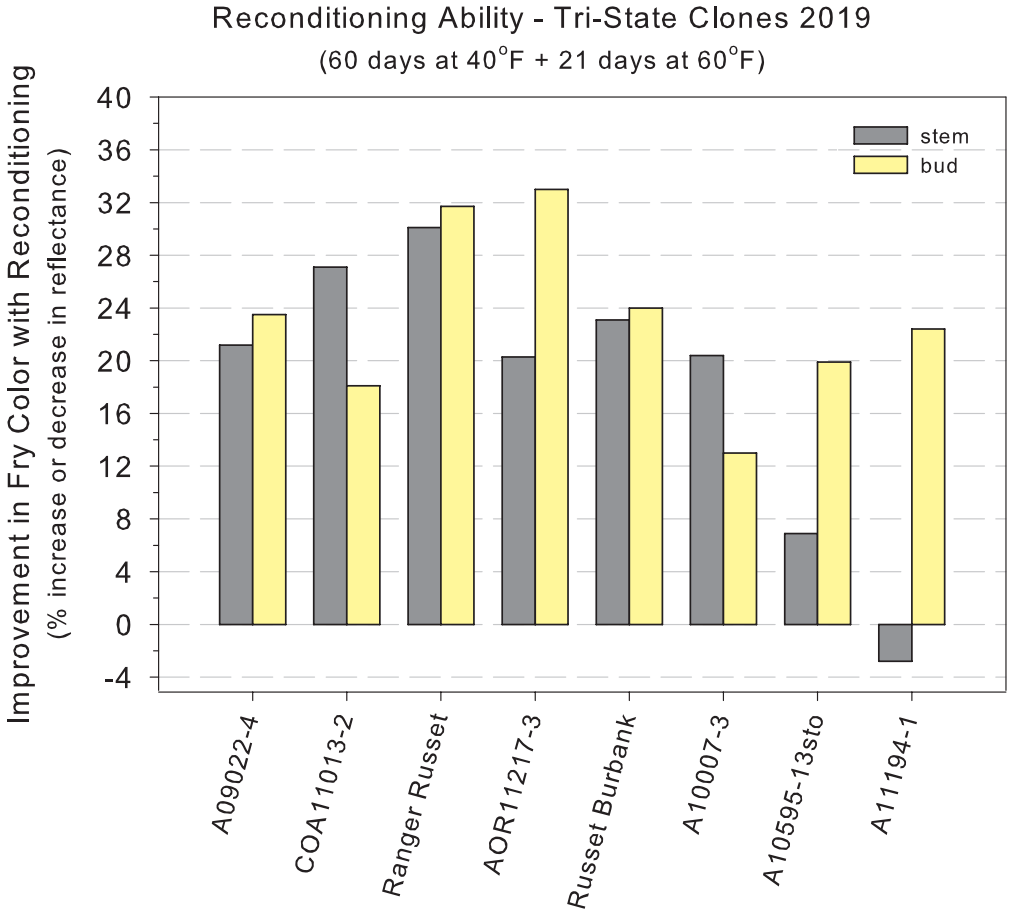




Top: At-harvest and after-storage French fry colors (stem end) of clones in the Tri-State Trial. Tubers were stored for 60 days at 48, 44, and 40°F. The clones are ranked from best to worst on fry color of the 40°F-stored tubers. High reflectance values indicate light colored fries.
Bottom: Line graph depicting the effects of storage temperature on change in French fry processing quality (stem end fry color) of the most cold sweetening resistant (A09022-4 and A10595-13sto) and susceptible (A10007-3 and Russet Burbank) clones in the Tri-State Trial. *Indicates similar performance of the clones last year.

2019 Late Harvest Tri-State Trial



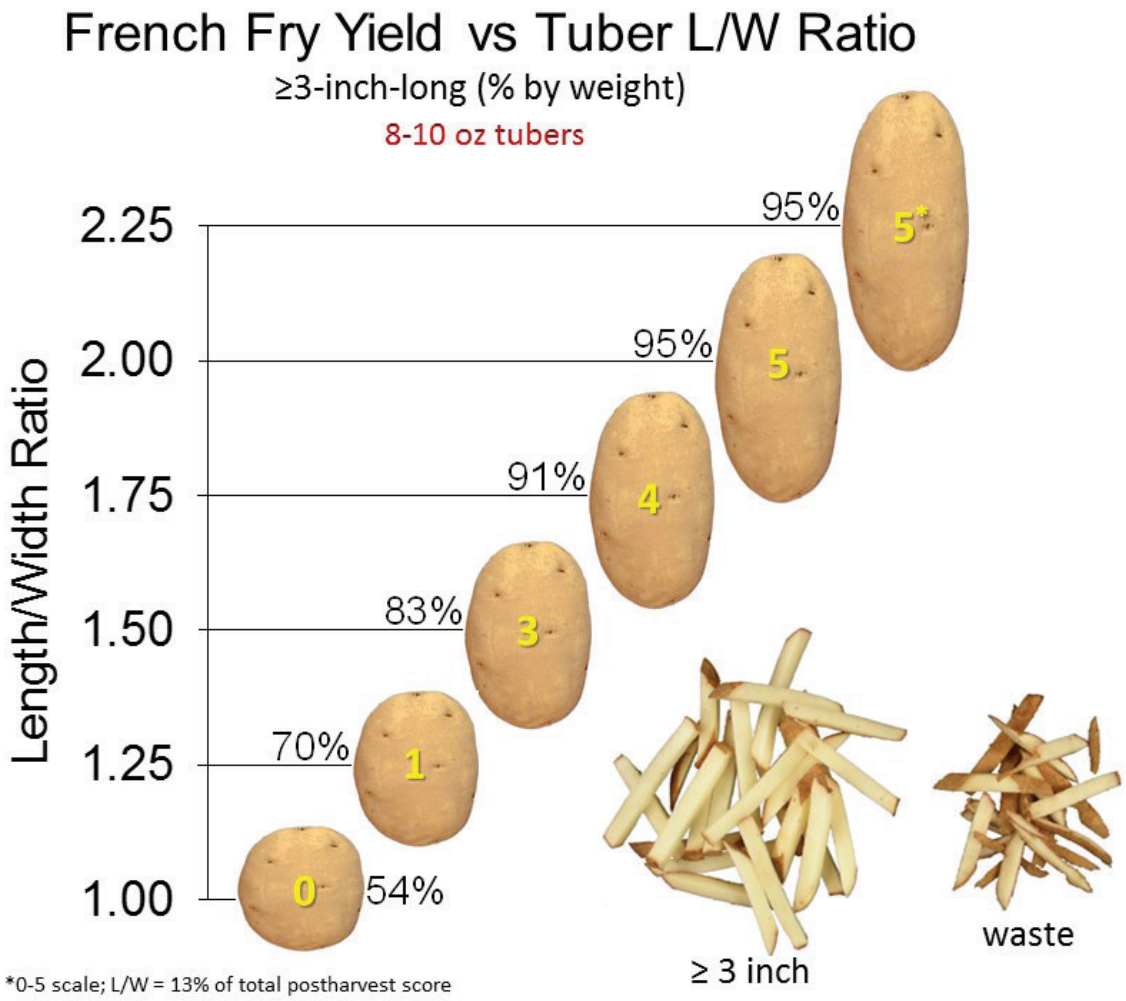


Reconditioning abilities of clones in the 2019 Tri-State Trial (3-state averages). Clones were stored at 40°F for 60 days after harvest and then reconditioned at 60°F for 21 days. Top: Stem end fry color before and after reconditioning. Numbers in bars indicate the USDA color rating of the stem end. Bottom: Percent improvement of stem and bud end fry color with reconditioning.

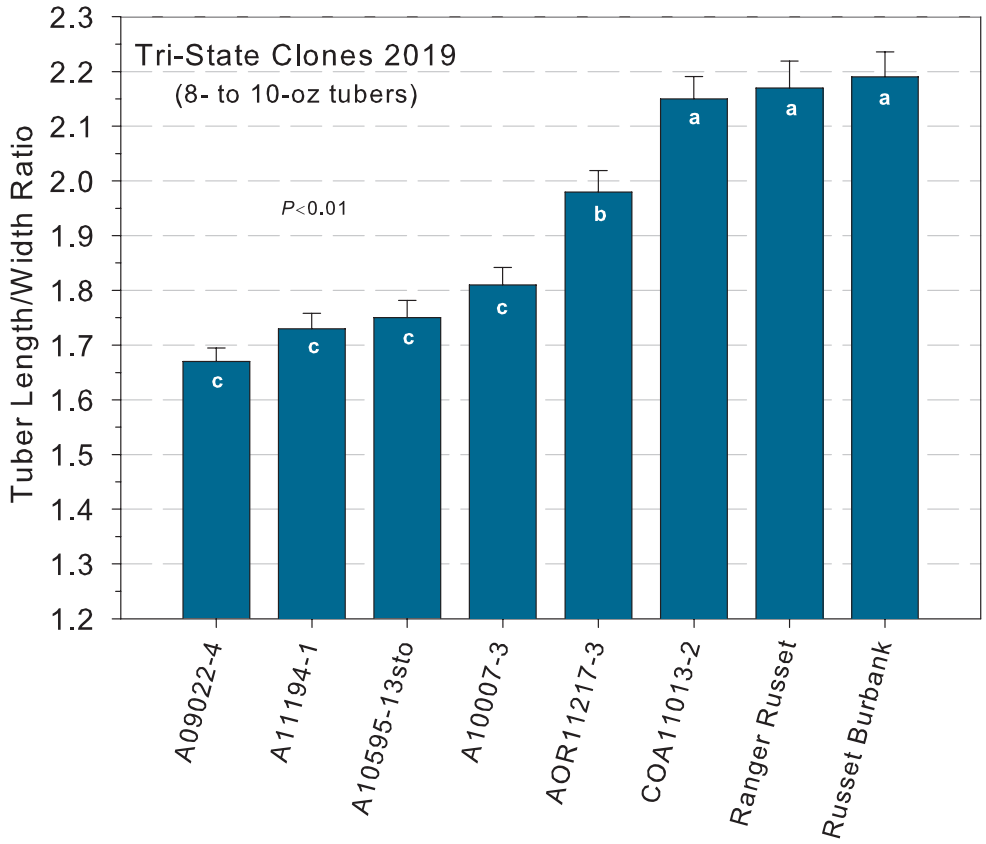
2019 Late Harvest Tri-State Trial

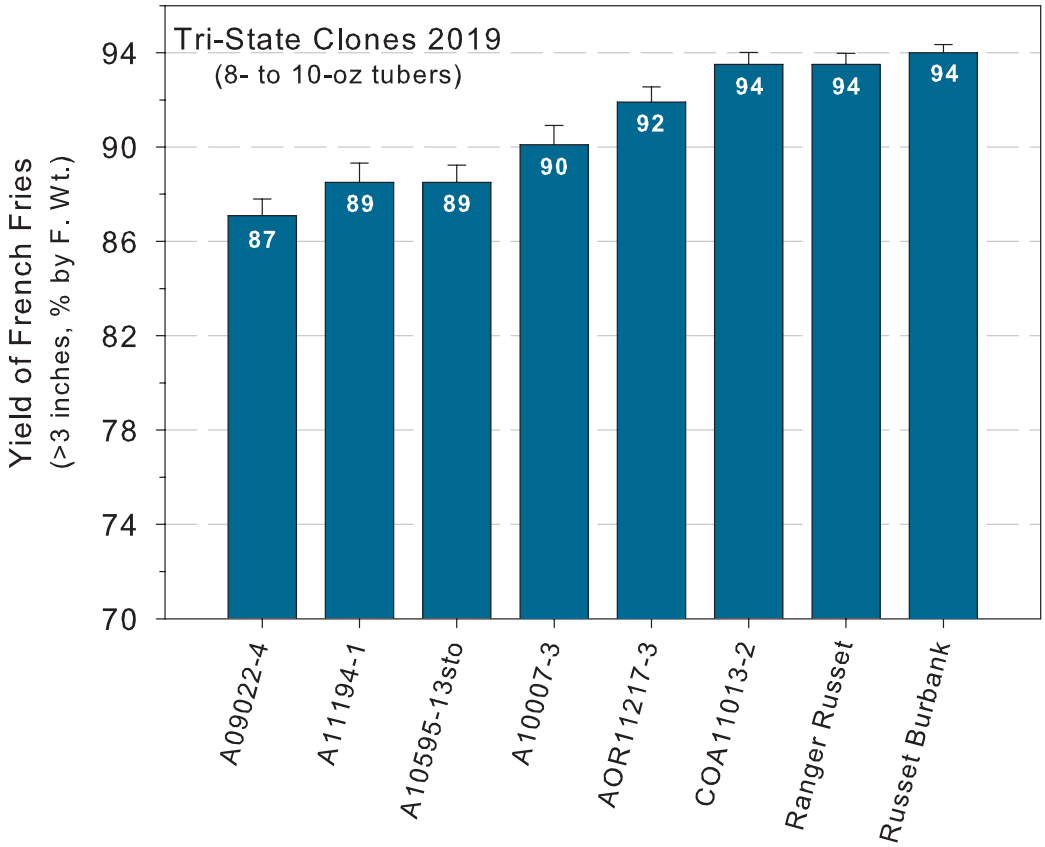
Length to Width Ratios of 8-10 oz Tubers

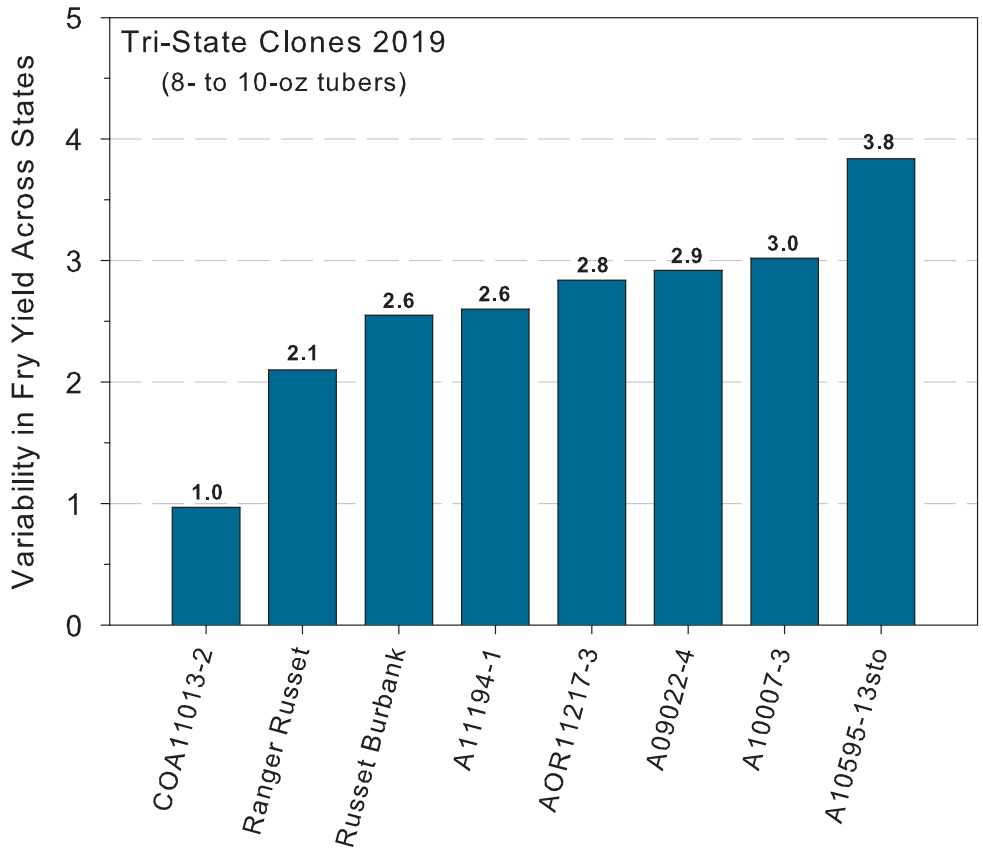
Clone	Length to width ratio WA	rtg §	ID	rtg §	OR	rtg §	3 State Avg.
1 Ranger Russet	1.87	**5**	2.46	**5**	2.19	**5**	2.17
2 Russet Burbank	1.80	**5**	2.41	**5**	2.37	**5**	2.19
3 A09022-4	1.55	**3**	1.79	**4**	1.67	**4**	1.67
4 A10007-3	1.65	**4**	1.97	**5**	1.80	**5**	1.81
5 A10595-13sto	1.54	**3**	1.83	**5**	1.87	**5**	1.75
6 A11194-1	1.68	**4**	1.88	**5**	1.63	**3**	1.73
7 AOR11217-3	1.70	**4**	2.23	**5**	2.01	**5**	1.98
8 COA11013-2	1.96	**5**	2.10	**5**	2.38	**5**	2.15
Average	1.72		2.08		1.99		1.93



2019 Late Harvest Tri-State Trial







Relative ranking of clones in the Late Season Tri-State Trial for variability in yield of French fries prepared from 8- to 10-oz tubers. Variability is expressed as the standard deviation (calculated across ID, WA and OR production sites) for the yield of fries ≥3 inches in length (% by fresh weight) from 8- to 10-oz tubers. High values reflect more variation in tuber shape and thus fry yield from state to state. For example, A10595-13sto had a length to width ratio of 1.75, resulting in 89% of the tuber producing usable French fries ≥3 inches in length (page 52). However, tuber shape of this entry also varied the most across production sites (see above), resulting in fry yields ranging from 85 to 93% (89±3.8%).

Pages 51-52: Tuber length to width ratios and the associated percentage yield of fries. Bars with same letter are not significantly different (P≤0.01).

2019 Early Harvest Regional Trial

Location: WSU Research Center – Othello, WA
Planting Date: April 4 Vine Kill Date: July 22
Harvest Date: August 5 Days Grown: 109

Regional trials are conducted throughout the western region of the United States, including Washington. Entries in the Regional Trial are chosen by a coordinating committee and are grown for both early (Early Regional) and full (Late Regional) season harvest. The 2019 early harvest trial compared 4 local reference varieties to 15 new clones on the WSU Othello Research Station. The following is a summary of the Washington field and post-harvest results. See also: grading comments and merit scores near front of book.

Fresh Market Standout(s): NONE
Process Market Standout(s): AOR07781-5, OR12133-10, POR12NCK50-1, AO7769-4

Yield and Economic Data

- **Total Yield and U.S. #1 Yield**
  Highest: OR12133-10 had the highest total yield (825 CWT/A) and A07769-4 had the highest U.S. #1 yield (716 CWT/A). Shepody had the second highest total yield (788 CWT/A) and A10021-5TE had the second highest U.S. #1 yield (691 CWT/A).

  Lowest: CO09205-2RU had the lowest total yield (544 CWT/A) and CO10091-1RU had the lowest U.S. #1 yield (358 CWT/A). CO10091-1RU had the second lowest total yield (546 CWT/A); CO09076-3RU had the second lowest U.S. #1 yield (389 CWT/A).

- **% U.S. #1's (greater than 4 oz)**
  Highest: A08422-4VRsto (94%) and A07769-4 (93%).
  Lowest: CO10091-1RU (65%) and CO09076-3RU (69%).

- **Carton Yield (100 to 50 Count (7 to 18 oz U.S. #1 Tubers))**
  Highest: A08422-4VRsto (27.3 Tons/A) and A07769-4 (26.8 Tons/A).
  Lowest: CO10091-1RU (5.2 Tons/A).

- **Gross Return ($/acre)**
  Fresh Market Highest: A07769-4 and A08422-4VRsto.
  Fresh Market Lowest: CO10091-1RU, CO09076-3RU, and CO09205-2RU.
  Process Market Highest: A07769-4 and A071012-4BF.

For detailed information see the Early Harvest Regional Summary tables on the next few pages.

2019 Early Harvest Regional Trial

Summaries

ENTRY	TOTAL YIELD CWT/A		TOTAL YIELD Tons/A	US # 1's* > 4 oz % of Total Yield	US # 2's* > 4 oz % of Total Yield	Culls* & < 4 oz % of Total Yield	CARTON YIELD 100-50 count (US 1's 7-18 oz) % of Total Yield	CARTON YIELD 100-50 count (US 1's 7-18 oz) Tons/A	PROCESS YIELD US 1's and 2's > 6 oz % of Total Yield	PROCESS YIELD US 1's and 2's > 6 oz Tons/A
Ranger Russet	689	*ABCD*	34.4	87	4	9	70	21.1	79	27.1
Russet Burbank	734	*ABCD*	36.7	80	7	13	62	18.0	69	25.3
Russet Norkotah	659	*ABCD*	32.9	87	1	11	58	16.6	69	22.7
Shepody	788	*A*	39.4	86	5	9	64	21.7	83	32.7
A07061-6	782	*A*	39.1	83	4	14	53	17.1	59	23.3
A071012-4BF	730	*ABCD*	36.5	93	1	6	66	22.4	75	27.5
A07769-4	767	*AB*	38.4	93	1	6	75	26.8	81	31.1
A08422-4VRsto	723	*ABCD*	36.1	94	2	4	81	27.3	88	31.9
A08433-4VR	782	*A*	39.1	73	16	11	69	19.8	82	32.1
A10021-5TE	777	*AB*	38.8	89	3	9	71	24.5	82	31.8
AO02183-2	758	*ABC*	37.9	88	3	9	71	23.5	79	30.0
AOR07781-5	686	*ABCD*	34.3	90	4	7	76	23.4	83	28.4
CO09076-3RU	571	*CD*	28.5	69	6	25	52	10.1	55	15.6
CO09205-2RU	544	*D*	27.2	79	3	18	46	9.9	54	14.8
CO10087-4RU	588	*BCD*	29.4	82	1	16	47	11.5	58	17.3
CO10091-1RU	546	*D*	27.3	65	1	34	29	5.2	32	9.0
COTX05095-2Ru/Y	744	*ABC*	37.2	81	1	17	43	12.9	52	19.5
OR12133-10	825	*A*	41.2	82	8	10	57	19.1	66	27.3
POR12NCK50-1	703	*ABCD*	35.2	84	2	14	55	16.2	60	21.2

ENTRY	US # 1 YIELD > 4 oz CWT/A	STATS**	US # 1 YIELD > 4 oz Tons/A	4-7 oz* %	7-14 oz* %	> 14 oz* %	> 4 oz SPECIFIC GRAVITY	INTERNAL DEFECTS (%) (8-12 oz tubers) % HH	% BC	% IBS
Ranger Russet	599	*ABC*	29.9	27	61	12	1.080	0	0	0
Russet Burbank	584	*ABC*	29.2	32	55	13	1.080	0	17	0
Russet Norkotah	575	*ABC*	28.7	42	56	2	1.073	0	0	0
Shepody	674	*A*	33.7	16	45	39	1.076	0	0	0
A07061-6	647	*ABC*	32.4	46	50	3	1.071	0	0	0
A071012-4BF	679	*A*	33.9	33	61	6	1.086	0	0	0
A07769-4	716	*A*	35.8	23	69	8	1.081	0	0	0
A08422-4VRsto	676	*A*	33.8	16	71	12	1.076	0	0	0
A08433-4VR	573	*ABC*	28.7	14	49	37	1.070	0	0	0
A10021-5TE	691	*A*	34.5	21	56	23	1.079	0	0	0
AO02183-2	664	*A*	33.2	23	60	17	1.077	0	0	0
AOR07781-5	615	*AB*	30.7	23	68	9	1.084	0	0	0
CO09076-3RU	389	*D*	19.5	42	43	15	1.073	0	0	0
CO09205-2RU	427	*CD*	21.4	54	43	3	1.079	0	0	0
CO10087-4RU	482	*BCD*	24.1	52	45	4	1.081	0	0	0
CO10091-1RU	358	*D*	17.9	71	29	0	1.075	0	0	0
COTX05095-2Ru/Y	606	*ABC*	30.3	57	40	3	1.079	0	0	0
OR12133-10	676	*A*	33.8	43	55	2	1.075	0	0	0
POR12NCK50-1	591	*ABC*	29.5	44	52	4	1.082	0	0	0

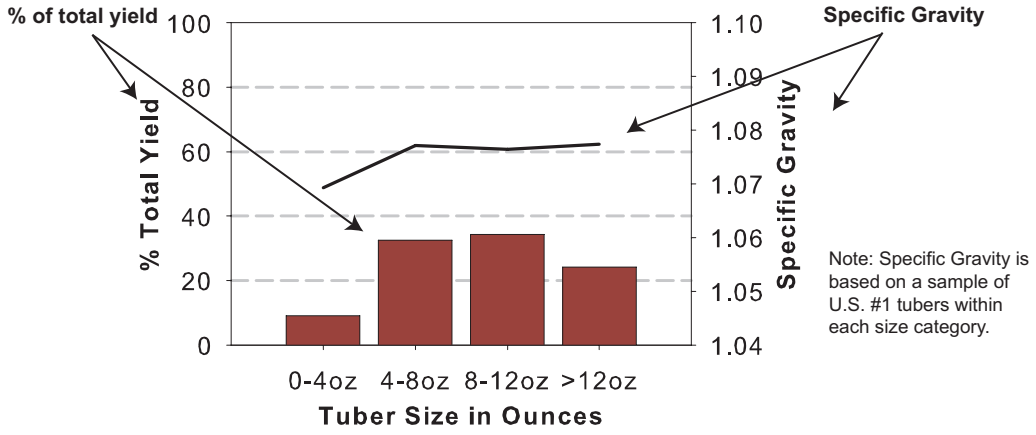
ENTRY	30 DAY STAND % Emerged	40 DAY STAND % Emerged	50 DAY STAND % Emerged	STEMS PER PLANT Above Ground	AVERAGE TUBER WEIGHT Ounces	AVERAGE TUBER NUMBER Tubers/Plant	SKIN SET 1 = Poor 5 = Good	TUBER SHAPE 1 = Round 5 = Long	BRUISE (%) (8-12 oz tubers) BLACKSPOT	BRUISE (%) (8-12 oz tubers) SHATTER
Ranger Russet	87	98	100	2.3	7.4	9.7	4.0	3.3	20	0
Russet Burbank	47	100	100	2.5	7.9	9.7	3.0	3.0	3	10
Russet Norkotah	78	98	100	3.0	6.7	10.3	4.0	4.0	0	10
Shepody	62	98	100	2.3	9.8	8.4	3.0	3.0	0	10
A07061-6	69	96	100	2.9	6.0	13.5	4.0	2.0	0	0
A071012-4BF	27	100	100	2.8	7.4	10.3	4.0	2.3	7	3
A07769-4	27	100	100	2.7	8.2	9.7	3.7	2.3	0	24
A08422-4VRsto	11	98	98	2.5	8.9	8.4	3.7	2.3	3	27
A08433-4VR	38	93	93	2.0	10.7	7.6	3.0	2.7	3	0
A10021-5TE	7	100	100	2.7	8.9	9.2	4.0	4.0	0	17
AO02183-2	64	96	100	2.5	8.7	9.1	3.3	4.0	0	7
AOR07781-5	13	96	100	3.9	8.1	8.8	4.0	3.0	7	13
CO09076-3RU	16	56	84	3.2	6.4	9.4	3.0	4.0	7	21
CO09205-2RU	18	38	80	3.0	6.0	9.6	4.0	3.5	4	10
CO10087-4RU	18	51	89	3.2	6.1	9.9	4.0	3.0	0	37
CO10091-1RU	11	44	98	2.7	4.5	12.6	4.0	2.0	0	13
COTX05095-2Ru/Y	38	91	96	3.9	5.7	13.7	4.0	2.0	0	18
OR12133-10	56	100	100	2.8	6.7	12.8	3.0	3.0	3	20
POR12NCK50-1	56	93	100	3.7	6.4	11.5	3.7	3.0	3	0

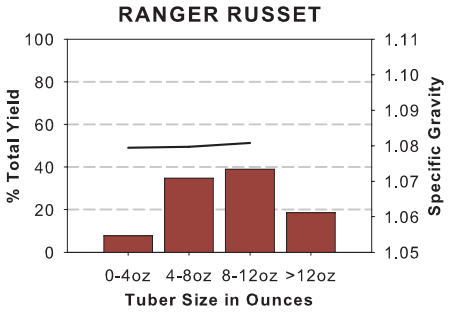
* Percent values may not total 100% due to rounding

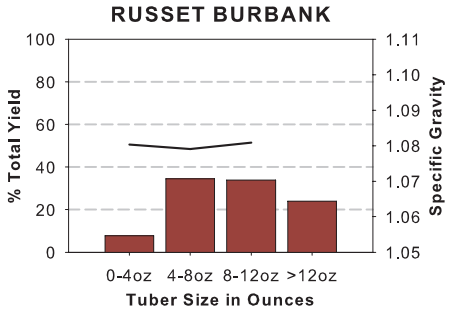
2019 Early Harvest Regional Trial

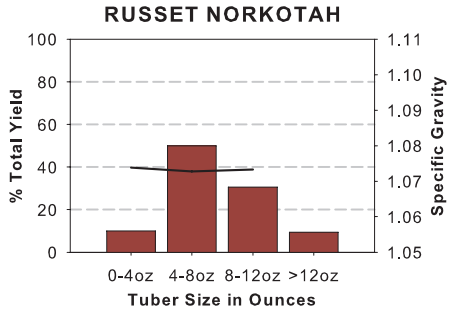
Tuber Yield and Specific Gravity Distributions

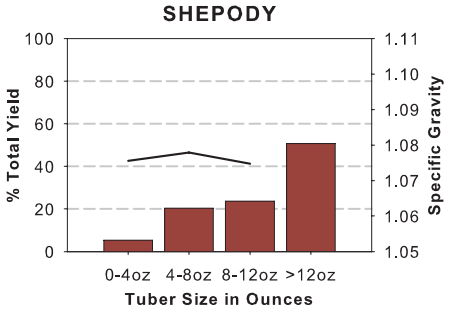
In-Row Spacing = 12 inches, Row Width = 32 inches

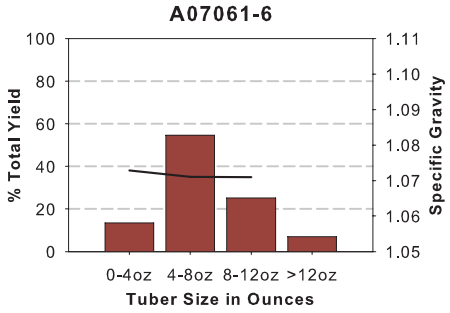


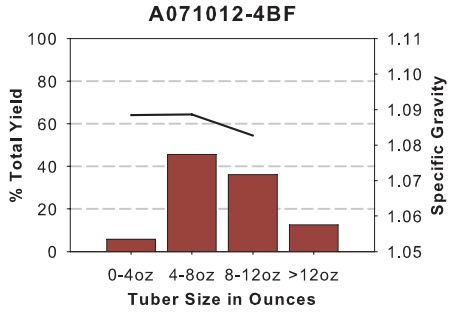


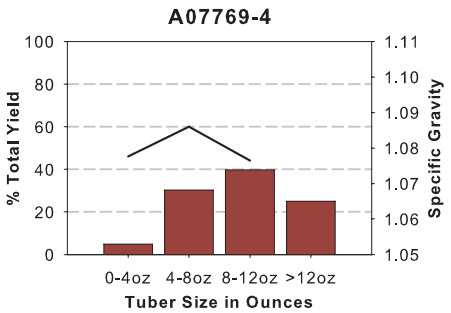


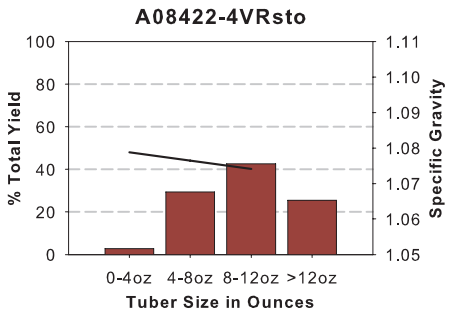


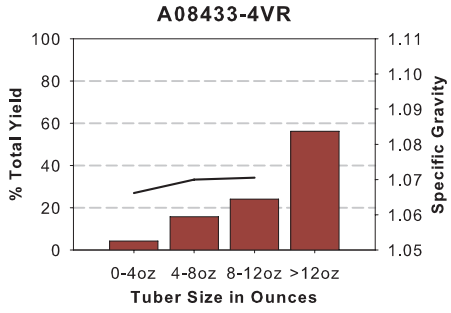


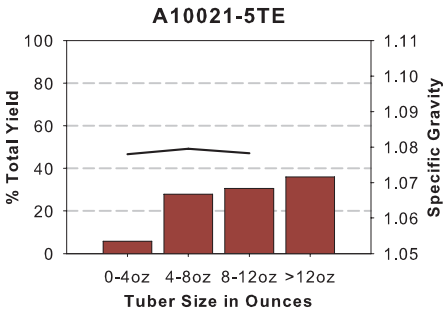


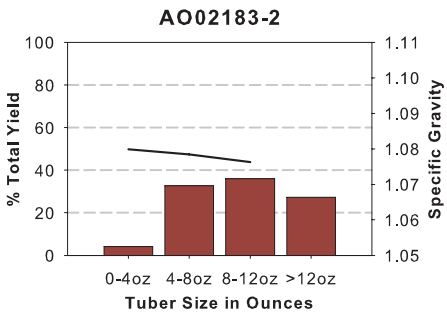


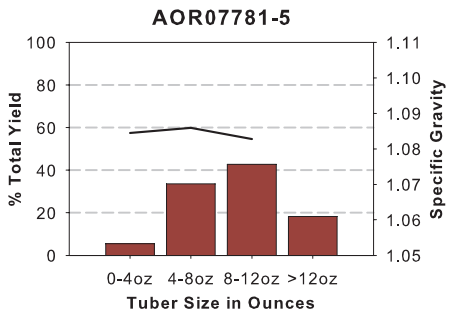


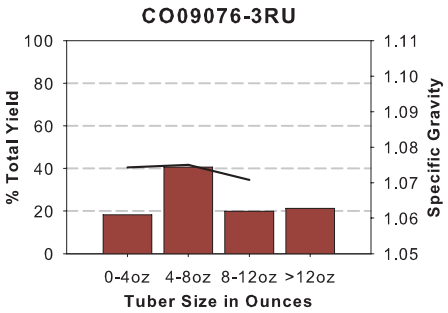


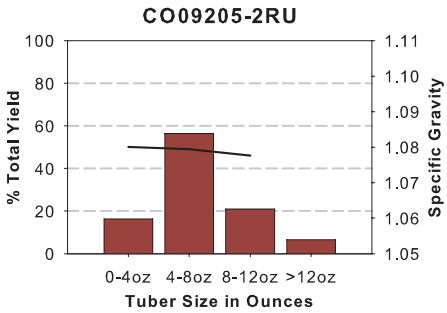


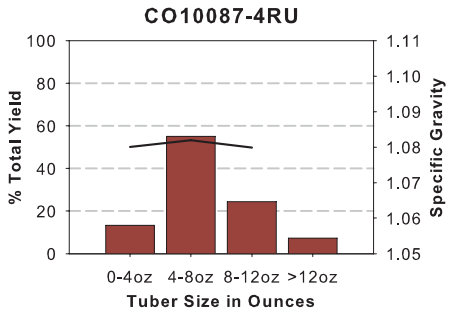

A10021-5TE
% Total Yield
Specific Gravity
0-4oz 4-8oz 8-12oz >12oz
Tuber Size in Ounces

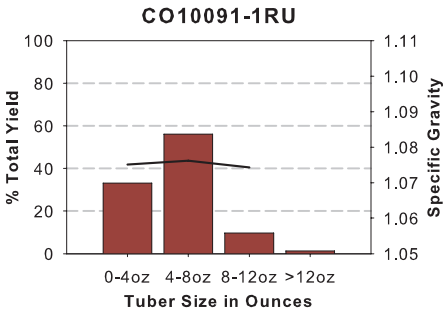

AO02183-2
% Total Yield
Specific Gravity
0-4oz 4-8oz 8-12oz >12oz
Tuber Size in Ounces

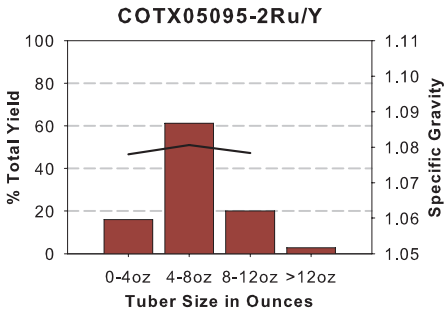

AOR07781-5
% Total Yield
Specific Gravity
0-4oz 4-8oz 8-12oz >12oz
Tuber Size in Ounces


CO09076-3RU
% Total Yield
Specific Gravity
0-4oz 4-8oz 8-12oz >12oz
Tuber Size in Ounces


CO09205-2RU
% Total Yield
Specific Gravity
0-4oz 4-8oz 8-12oz >12oz
Tuber Size in Ounces


CO10087-4RU
% Total Yield
Specific Gravity
0-4oz 4-8oz 8-12oz >12oz
Tuber Size in Ounces


CO10091-1RU
% Total Yield
Specific Gravity
0-4oz 4-8oz 8-12oz >12oz
Tuber Size in Ounces


COTX05095-2Ru/Y
% Total Yield
Specific Gravity
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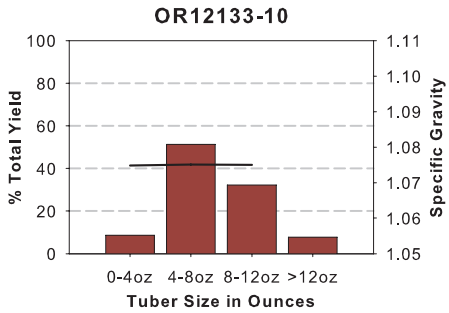
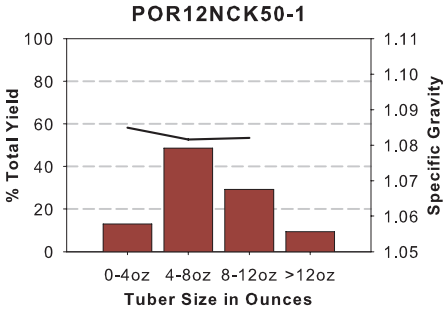
Tuber Size in Ounces


OR12133-10
% Total Yield
Specific Gravity
0-4oz 4-8oz 8-12oz >12oz
Tuber Size in Ounces

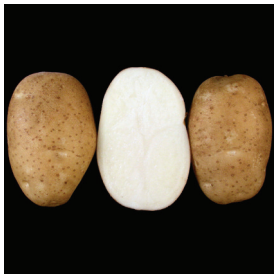

POR12NCK50-1
% Total Yield
Specific Gravity
0-4oz 4-8oz 8-12oz >12oz
Tuber Size in Ounces

2019 Early Harvest Regional Trial

Tubers

Ranger Russet

A08422-4VRsto



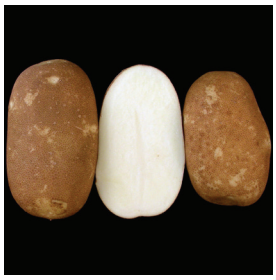
AOR07781-5

CO09076-3RU

Russet Burbank

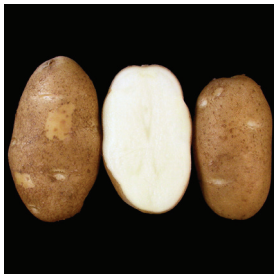
A08433-4VR

CO09205-2RU

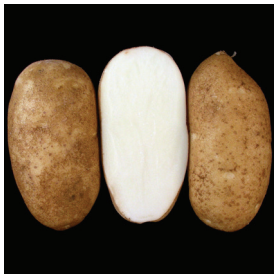


CO10087-4RU

Russet Norkotah

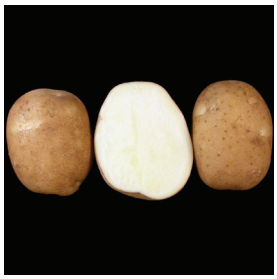


A10021-5TE

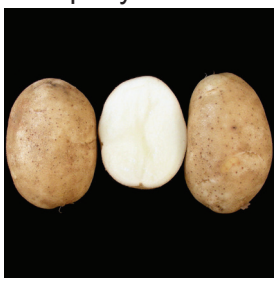


CO10091-1RU

COTX05095-2Ru/Y

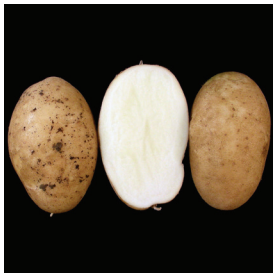


Shepody



AO02183-2

OR12133-10



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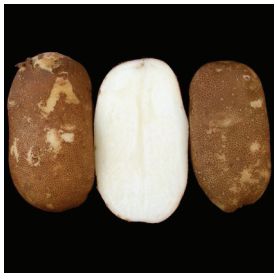
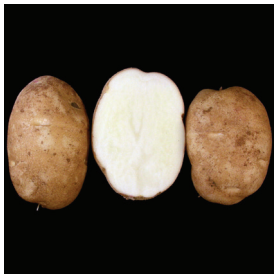
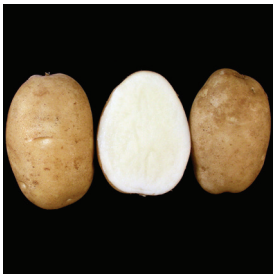


A07061-6

A071012-4BF



A07769-4



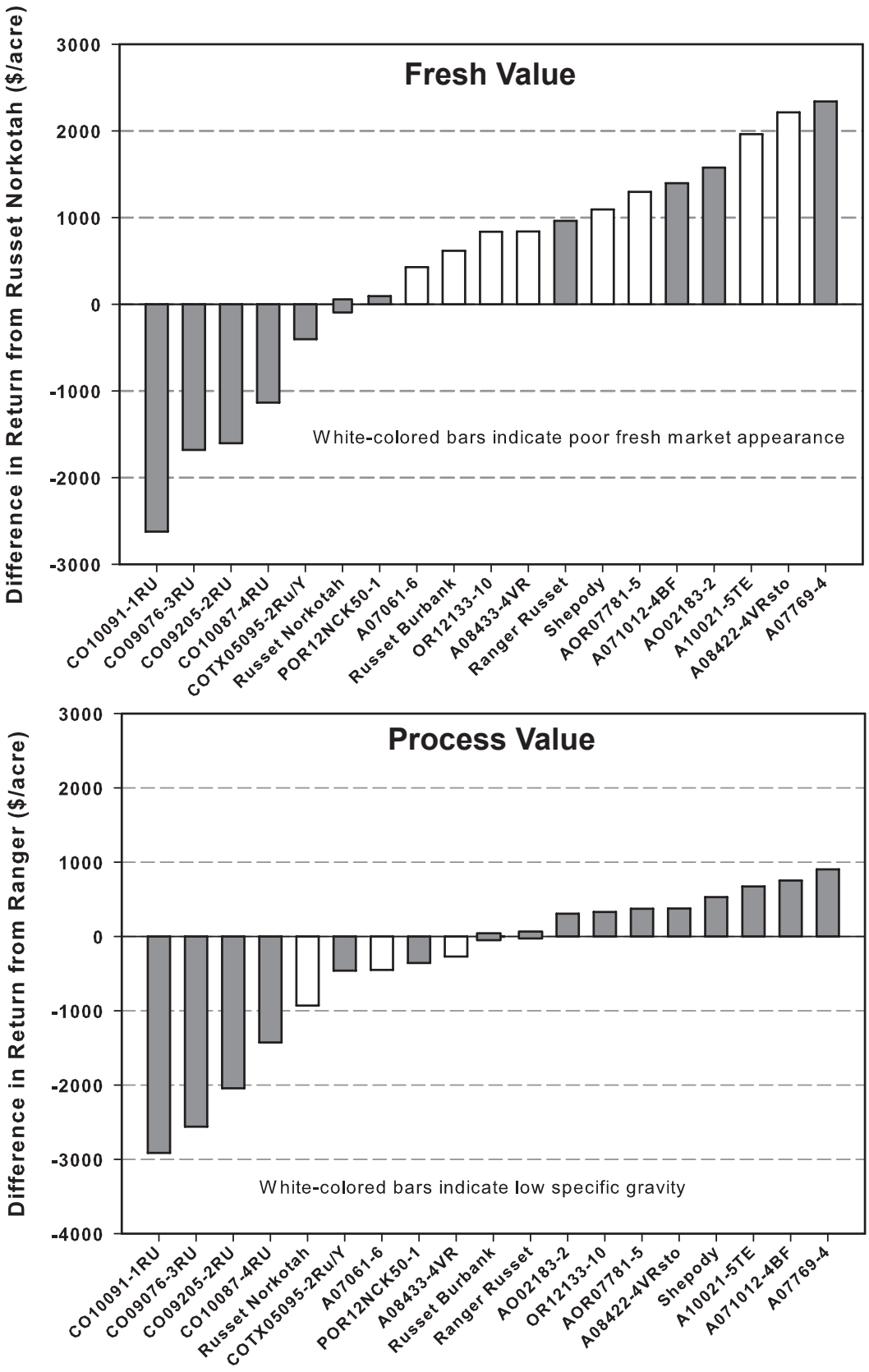


Figure 1 (Top). Difference in gross return per acre (Fresh Market) from Russet Norkotah calculated by subtracting the gross return of Russet Norkotah from the gross return of the particular entry. Entries with the white-colored bars may not appeal to fresh market consumers due to the undesirable shape or appearance. **Figure 2 (Bottom)**. Difference in gross return per acre (Process Market) from Ranger Russet calculated by subtracting the gross return of Ranger Russet from the gross return of the particular entry.

2019 Late Harvest Regional Trial

Location: WSU Research Center – Othello, WA
Planting Date: April 3 Vine Kill Date: Aug 29
Harvest Date: Sept 9 Days Grown: 148

Regional trials are conducted throughout the western region of the United States, including Washington. Entries in the Regional Trial are chosen by a coordinating committee and are grown for both early (Early Regional) and full (Late Regional) season harvest. This year's trial included 3 local reference varieties and 15 new clones. The following is a summary of the Washington field and post harvest results. For additional information, see the grading comments and merit scores near front of book.

Fresh Market Standout(s): NONE
Process Market Standout(s): AO02183-2, AOR07781-5

Yield and Economic Data

- **Total and U.S. #1 Yield**
  Highest: OR12133-10 had the highest total yield (1276 CWT/A) the highest U.S. # 1 yield (1147 CWT/A). AO02183-2 had the second highest total yield (1218 CWT/A) and the second highest U.S. #1 yield (1091 CWT/A).
  Lowest: CO10087-4RU had the lowest total yield (705 CWT/A) and CO09076-3RU had the lowest U.S. #1 yield (411 CWT/A).

- **% U.S. #1 Yield Greater Than 4oz.**
  Highest: POR12NCK50-1 (93%).
  Lowest: CO09076-3RU (56%), CO09205-2RU (65%).

- **Carton Yield (100 to 50 Count (7 to 18 oz US #1 Tubers))**
  Highest: OR12133-10 (38.4 Tons/A), A07061-6 (34.2 Tons/A).
  Lowest: CO09076-3RU (10.4 Tons/A), CO09205-2RU (16.3 Tons/A).

- **Gross Return ($/acre)**
  Fresh Market Highest: OR12133-10, A07061-6, and AO02183-2.
  Fresh Market Lowest: CO09076-3RU, CO09205-2RU, and CO10087-4RU.
  Process Market Highest: AO02183-2, OR12133-10, and A071012-4BF.
  Process Market Lowest: CO09076-3RU, CO09205-2RU, and CO10087-4RU.

For detailed information see the Late Harvest Regional Summary tables on the next few pages.

2019 Late Harvest Regional Trial

Postharvest Information

The 2019 trial evaluated thirteen numbered clones along with Ranger Russet and Russet Burbank as check cultivars from each growing location. When averaged across states, all entries received higher overall postharvest scores than Russet Burbank (RB). An asterisk in the summary below indicates similar performance and/or ranking in trials from previous years.

- **Overall Postharvest Rating**

  Highest scoring: AO02183-2*, AOR07781-5*, A10021-5TE*, CO10087-4RU
  Lowest scoring: RB*, A08422-4VRsto, CO10091-1RU

- **Low Temperature Sweetening**

  Most resistant: AO02183-2*, AOR07781-5*, A10021-5TE*
  Most susceptible: A08422-4VRsto, RB*, A071012-4BF*

- **Tuber asparagine content** (WA Regional Trial samples)

  Highest concentration: CO09205-2RU*, CO10091-1RU, A07061-6*
  Lowest concentration: A08433-4VR*, A07769-4*, A071012-4BF

- **French Fry Taste Panel**

  Highest rated: AO02183-2, AOR07781-5*, A10021-5TE*, CO10087-4RU
  Lowest rated: RB*, OR12133-10, A071012-4BF

- **Blackspot Bruise Susceptibility**

  Most resistant: CO10091-1RU, A08433-4VR, CO09205-2RU*
  Most susceptible: RR*, A071012-4BF*

- **Variability in Tuber Shape & Fry Yield (8- to 10-oz tubers)**

  Lowest L/W: CO10091-1RU, A07769-4*
  Highest L/W: RR*, A10021-5TE*, CO09205-2RU*, RB*
  Least variable: A10021-5TE, A08422-4VRsto, CO09205-2RU*
  Most variable: CO10091-1RU

Details

- AO02183-2*, AOR07781-5*, A10021-5TE*, and CO10087-4RU were the highest rated entries, accumulating an average of 31.2, 31.1, 29.7, and 28.7 of 38 possible points, respectively. Overall scores were generally higher in 2018 compared with this year.

- AO02183-2*, AOR07781-5*, and A10021-5TE* were resistant to cold sweetening, producing USDA 0-2 fries (stem end) when stored for 60 days at 40°F averaged across locations. Moreover, AO02183-2 tubers have tolerance to heat stress for retention of the cold-sweetening resistant phenotype. A08422-4VRsto, RB*, and A071012-4BF* were susceptible to LTS, producing USDA 4 fries after 60 days at 40°F.

- A08433-4VR*, A07769-4*, and A071012-4BF had 62, 47, and 43% lower (P<0.05) concentrations of asparagine (asn) (acrylamide precursor) than RB, respectively. A08433-4VR also averaged 42% (2017) and 48% (2018) lower asparagine than RB in past trials. However, A08433-4VR is highly susceptible to buildup in reducing sugars with decreasing storage temperature and would therefore likely not have a low acrylamide forming phenotype. By contrast, AO02183-2 was highly resistant to cold sweetening, which when coupled with its low asn concentration would limit acrylamide formation during processing. Low asparagine and reducing sugars are indicators of low acrylamide forming potential.

- RB*, A08422-4VRsto, and CO10091-1RU scored lowest on overall postharvest performance with 15.6, 19.7, and 20.3 of 38 possible points, respectively.

- CO09205-2RU*, RB*, A07061-6*, CO10091-1RU, and A07769-4 had gravities of 1.071-1.074 when averaged across states (too low for processing contracts). Twelve of the 15 entries had average gravities ≤1.079. Average gravities of the three remaining entries (AOR07781-5, CO10087-4RU, A071012-4BF) ranged from 1.083-1.086.

- AO02183-2, AOR07781-5*, A10021-5TE*, and CO10087-4RU were the favorites in the French fry taste panels, averaging 3.8/5 across growing locations (5 is best). RB*, OR12133-10, and A071012-4BF were the lowest scoring clones (avg=3.1/5).

- On average, tubers grown in OR produced the lightest fry colors at harvest. The Regional entries averaged 83 and 70% of their at-harvest process quality (stem end fry color) when stored at 48 and 44°F for 60 days, respectively.

- Uniformity of fry color (bud to stem end fry color difference) at harvest was an issue this year from WA with 7/15 clones rated unacceptable for fry color uniformity. By contrast, only 1/15 clones from ID, and 4/15 clones from OR rated unacceptable for fry color uniformity. OR12133-10 and CO09205-2RU varied the most in ability to maintain process quality during storage for 60 days at 44°F across production sites.

- AO02183-2*, AOR07781-5*, OR12133-10, A08433-4VR*and CO10091-1RU showed the greatest improvement in stem end fry color when reconditioned at 60°F following storage for 60 days at 40°F. Reconditioning tubers of CO09205-2RU*, POR12NCK50-1, and CO10087-4RU had little effect on change in stem end fry color. Differences between bud and stem end fry color following reconditioning were highest in CO09205-2RU*, POR12NCK50-1, RB*, and A071012-4BF*, reflecting less improvement of stem vs bud end fry color and indicating that these clones may be more susceptible to sugar ends.

- CO10091-1RU, A08433-4VR, and CO09205-2RU* were resistant to blackspot, averaging 9.5% bruise (stem end) in the controlled impact study (3-state average). These entries also scored lowest in bruise severity, averaging 1.2/5 (1= no bruise; 5= 100% of impact area is dark). RR* and A071012-4BF* were highly susceptible, averaging 88% bruise. Bruise severity was also greatest in these two entries (average 3.5/5).

- ID-grown tubers (8-10 oz) had the highest L/W ratios (2.15) compared with those grown in OR (2.03) and WA (1.69). CO10091-1RU, and A07769-4* had the lowest L/W ratios (avg. 1.69), reflecting a rounder tuber shape phenotype. RR*, A10021-5TE*, CO09205-2RU*, and RB* had the highest L/W ratios (2.12-2.28). CO10091-1RU showed the greatest variation in L/W ratios of 8- to 10-oz tubers across production sites. By contrast, the L/W ratios of A10021-5TE, A08422-4VRsto, and CO09205-2RU were least affected by growing location.

- On average, 70% of OR12133-10, A07061-6, and AOR07781-5 tubers sprouted with sprout lengths ranging from 0.5 to 1 inch during 60 days of storage at 48°F, indicating relatively short dormancy (RR = 47% 0.25-inch sprouts). By contrast, sprouting of A08433-4VR, A07769-4, and A071012-4BF tubers only averaged 21% (0.13-inch-long sprouts). A08422-4VRsto and RB tubers did not sprout.

- In longer-term storage studies, A07061-6*, A10021-5TE, AOR07781-5*, and OR12133-10 had relatively short dormancy, producing 0.67-inch-long sprouts after 7 months (RB=0.13 and RR=0.58 inches). All entries had longer sprouts than RB, indicating shorter dormancy.

- When stored for 7 months, AOR07781-5, A10021-5TE, POR12NCK50-1, AO02183-2, and OR12133-10 produced the lightest fries (avg = 52 ref units). A08433-4VR* and A07769-4 fried unacceptably dark when grown in OR and WA, respectively. Uniformity of fry color was unacceptable for 9/12 WA entries, 6/12 OR entries, and 4/12 ID entries.

Overall Regional Postharvest Merit Scores

	Postharvest Merit Scores			3 state
Clone	WA	ID	OR	Average
9 AO02183-2	4.0	3.5	4.8	4.1
10 AOR07781-5	3.8	4.2	4.3	4.1
8 A10021-5TE	3.5	3.7	4.6	3.9
12 CO10087-4RU	3.0	4.2	4.2	3.8
1 Ranger Russet	3.2	3.6	3.5	3.4
15 POR12NCK50-1	3.4	3.3	3.3	3.4
14 OR12133-10	2.4	3.3	4.0	3.2
11 CO09205-2RU	2.5	3.6	3.4	3.2
5 A07769-4	2.8	3.4	3.2	3.1
7 A08433-4VR	2.2	3.1	3.7	3.0
3 A07061-6	2.2	2.9	3.6	2.9
4 A071012-4BF	2.7	3.2	2.7	2.8
13 CO10091-1RU	2.1	No Sample	3.2	2.7
6 A08422-4VRsto	1.6	3.5	2.7	2.6
2 Russet Burbank	1.5	2.8	1.9	2.1

2019 Late Harvest Regional Trial
Summaries

ENTRY	TOTAL YIELD			US # 1's*	US # 2's*	Culls*	CARTON YIELD 100-50 count (US 1's 7-18 oz)		PROCESS YIELD US 1's and 2's > 6 oz	
	CWT/A	STATS**	Tons/A	> 4 oz	> 4 oz	& < 4 oz	% of Total Yield	Tons/A	% of Total Yield	Tons/A
				% of Total Yield						
Ranger Russet	1051	*ABCDEF*	52.6	80	11	9	46	24.1	86	45.3
Russet Burbank	1085	*ABCDE*	54.3	74	9	17	43	23.3	77	41.9
Russet Norkotah	814	*FG*	40.7	84	5	11	60	24.3	79	32.4
A07061-6	1167	*ABCD*	58.3	88	4	8	59	34.2	85	49.5
A071012-4BF	1082	*ABCDE*	54.1	88	3	10	41	22.3	88	47.7
A07769-4	1193	*ABC*	59.7	86	3	12	47	28.1	85	50.6
A08422-4VRsto	912	*DEFG*	45.6	90	0	9	65	29.7	87	39.4
A08433-4VR	1117	*ABCDE*	55.9	73	16	11	38	21.3	85	48.1
A10021-5TE	1011	*BCDEF*	50.5	84	4	11	46	23.5	83	42.1
AO02183-2	1218	*AB*	60.9	90	3	7	55	33.7	89	54.3
AOR07781-5	950	*CDEFG*	47.5	82	5	13	44	21.0	82	39.0
CO09076-3RU	743	*G*	37.2	56	10	34	28	10.4	56	20.8
CO09205-2RU	894	*EFG*	44.7	65	13	22	37	16.3	62	27.8
CO10087-4RU	705	*G*	35.2	84	3	14	51	17.8	69	24.5
CO10091-1RU	884	*EFG*	44.2	80	1	19	46	20.4	62	27.6
COTX05095-2Ru/Y	815	*FG*	40.7	84	1	15	51	20.8	65	26.4
OR12133-10	1276	*A*	63.8	90	1	9	60	38.4	86	54.8
POR12NCK50-1	1046	*ABCDEF*	52.3	93	2	5	63	33.2	86	45.0

ENTRY	US # 1 YIELD						> 4 oz SPECIFIC GRAVITY	INTERNAL DEFECTS (%) (8-12 oz tubers)		
	> 4 oz CWT/A	STATS**	> 4 oz Tons/A	4-7 oz*	7-14 oz*	> 14 oz*		% HH	% BC	% IBS
				%						
Ranger Russet	846	*BCDEF*	42.3	11	39	51	1.078	0	0	0
Russet Burbank	804	*CDEFGH*	40.2	13	38	49	1.077	0	0	12
Russet Norkotah	685	*FGH*	34.3	17	57	26	1.065	0	0	0
A07061-6	1029	*ABC*	51.5	12	50	38	1.071	0	0	0
A071012-4BF	948	*ABCDE*	47.4	4	27	69	1.087	0	0	0
A07769-4	1021	*ABCD*	51.1	6	30	64	1.073	0	0	0
A08422-4VRsto	822	*CDEFGH*	41.1	9	47	44	1.073	0	0	0
A08433-4VR	833	*CDEFG*	41.6	8	31	62	1.072	3	0	0
A10021-5TE	855	*BCDEF*	42.7	9	33	58	1.076	0	3	0
AO02183-2	1091	*AB*	54.5	8	38	54	1.081	0	0	5
AOR07781-5	775	*DEFGH*	38.8	8	36	57	1.083	0	0	0
CO09076-3RU	411	*I*	20.6	24	38	38	1.074	0	0	0
CO09205-2RU	581	*HI*	29.0	37	46	17	1.069	3	0	3
CO10087-4RU	593	*GHI*	29.7	33	53	13	1.080	0	0	0
CO10091-1RU	705	*EFGH*	35.2	36	49	14	1.074	0	0	0
COTX05095-2Ru/Y	684	*FGH*	34.2	37	57	5	1.074	0	0	0
OR12133-10	1147	*A*	57.3	9	47	44	1.076	0	0	0
POR12NCK50-1	971	*ABCD*	48.6	15	53	32	1.081	0	0	0

ENTRY	30 DAY STAND	40 DAY STAND	60 DAY STAND	STEMS PER PLANT	AVERAGE TUBER WEIGHT	AVERAGE TUBER NUMBER	SKIN SET 1 = Poor 5 = Good	TUBER SHAPE 1 = Round 5 = Long	BRUISE (%) (8-12 oz tubers)	
	% Emerged	% Emerged	% Emerged	Above Ground	Ounces	Tubers/Plant			BLACKSPOT	SHATTER
Ranger Russet	0	71	99	2.0	11.5	8.8	4.0	4.0	19	19
Russet Burbank	0	56	97	2.0	11.4	9.1	4.0	4.0	6	64
Russet Norkotah	0	47	100	2.4	9.0	8.6	4.0	3.0	0	15
A07061-6	0	25	93	2.7	9.7	11.4	4.0	2.0	0	36
A071012-4BF	0	42	96	2.0	14.6	7.1	4.0	3.0	3	56
A07769-4	0	53	100	2.3	13.7	8.4	3.3	3.0	0	92
A08422-4VRsto	0	40	97	1.9	11.2	7.8	4.0	3.0	0	63
A08433-4VR	0	47	97	1.8	13.6	7.8	3.5	3.0	0	44
A10021-5TE	0	3	97	3.1	11.8	8.3	4.0	3.0	0	43
AO02183-2	0	54	97	2.6	11.9	9.8	4.0	3.0	0	50
AOR07781-5	0	17	100	3.2	12.7	7.2	4.0	3.0	8	75
CO09076-3RU	0	6	93	2.3	8.1	8.7	3.5	3.8	0	42
CO09205-2RU	0	4	92	2.3	7.0	12.1	4.0	4.0	3	21
CO10087-4RU	0	0	81	2.4	7.4	9.1	4.0	3.0	0	89
CO10091-1RU	0	6	96	2.4	6.5	13.0	4.0	2.0	0	43
COTX05095-2Ru/Y	0	31	97	2.8	6.4	12.1	4.0	2.3	9	51
OR12133-10	0	76	96	2.4	11.2	10.9	4.0	2.3	5	78
POR12NCK50-1	0	57	96	2.7	9.9	10.1	3.0	3.0	0	49

* Percent values may not total 100% due to rounding

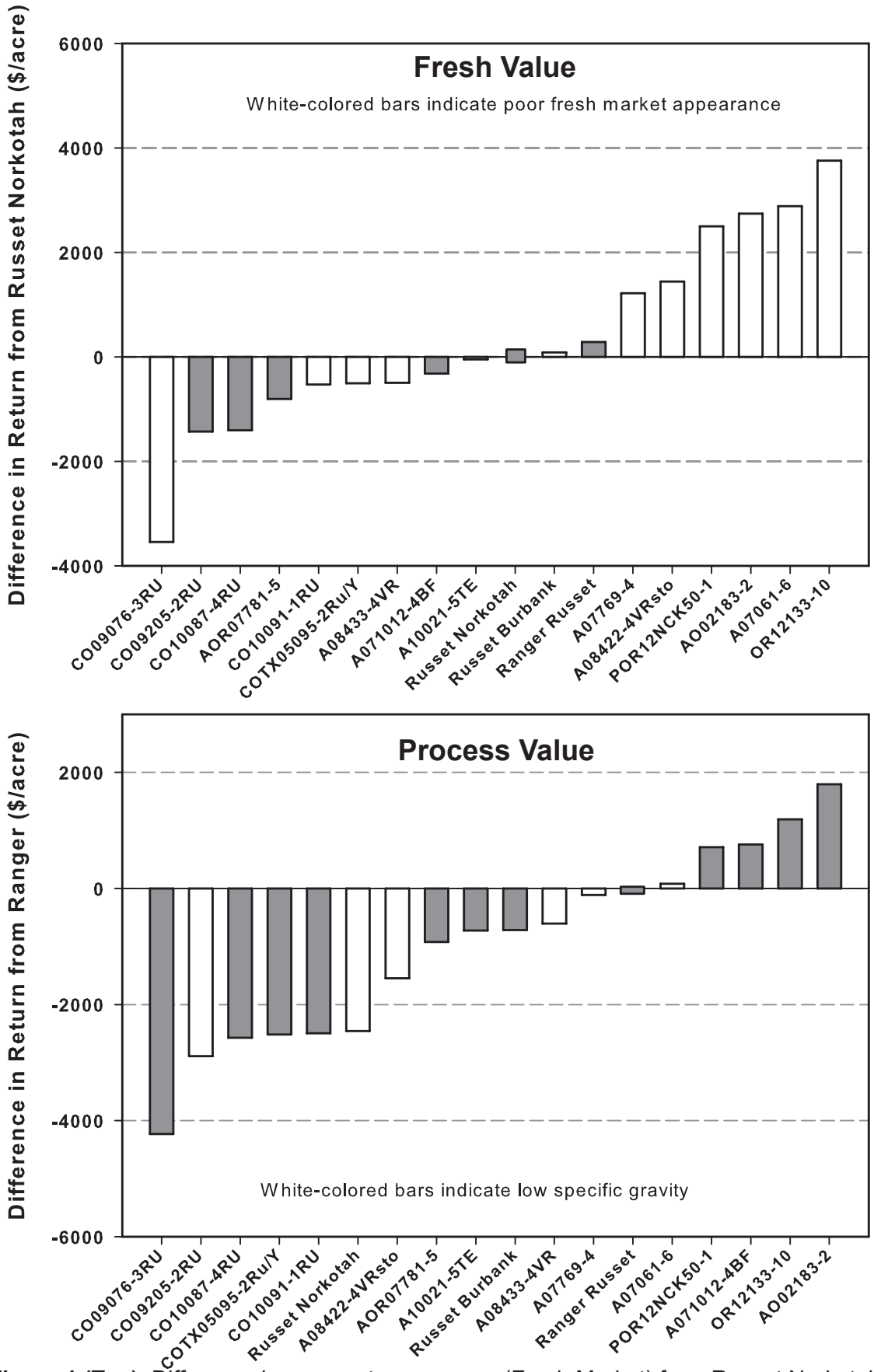
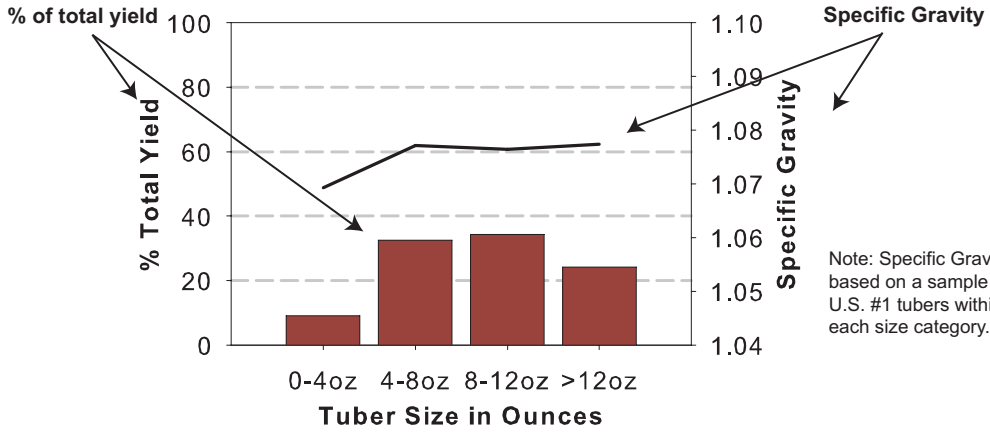


Figure 1 (Top). Difference in gross return per acre (Fresh Market) from Russet Norkotah calculated by subtracting the gross return of Russet Norkotah from the gross return of the particular entry. Entries with the white-colored bars may not appeal to fresh market consumers due to the undesirable shape or appearance. **Figure 2 (Bottom)**. Difference in gross return per acre (Process Market) from Ranger Russet calculated by subtracting the gross return of Ranger Russet from the gross return of the particular entry.

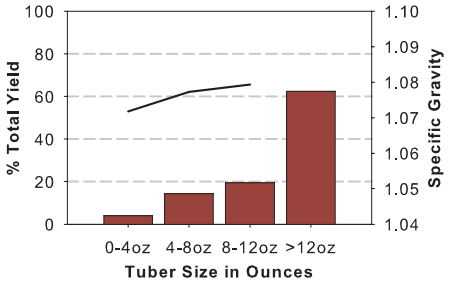
2019 Late Harvest Regional Trial

Tuber Yield and Specific Gravity Distributions

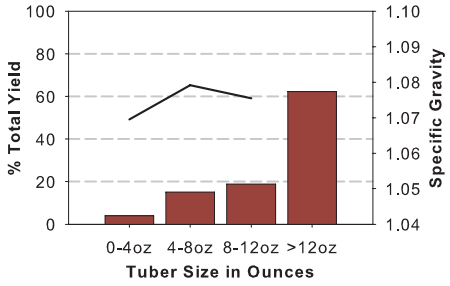
In-Row Spacing = 11 inches, Row Width = 32 inches



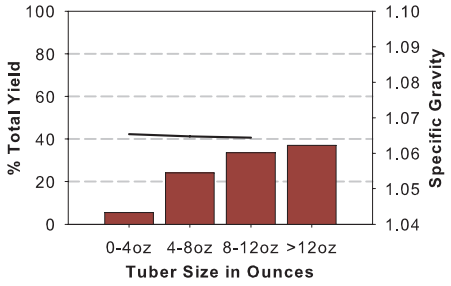
RANGER RUSSET



RUSSET BURBANK



RUSSET NORKOTAH



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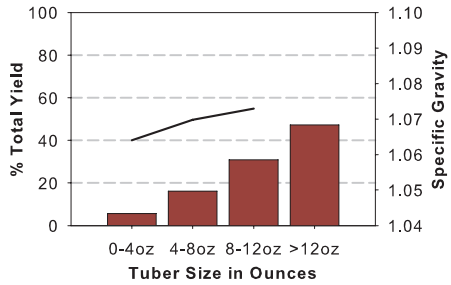

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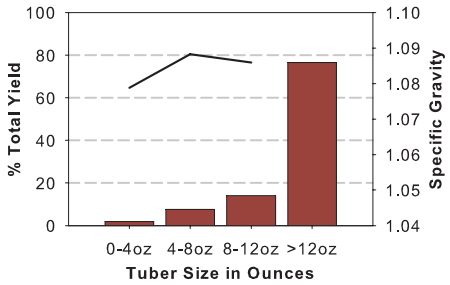

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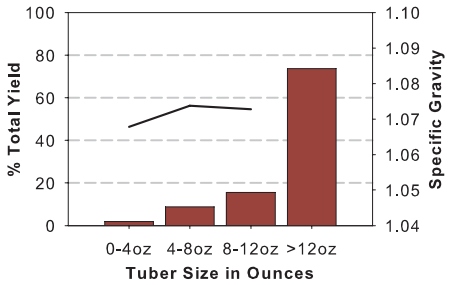

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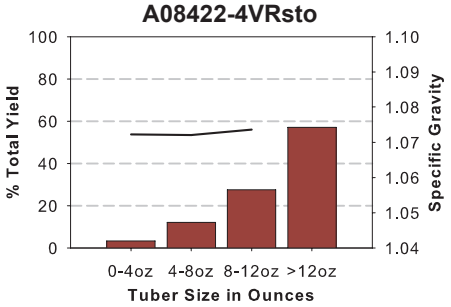

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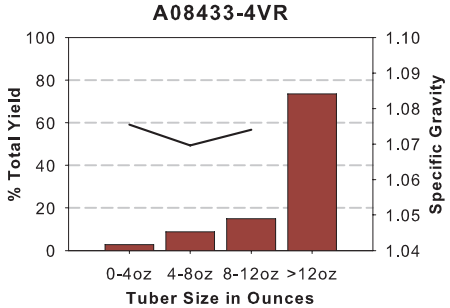

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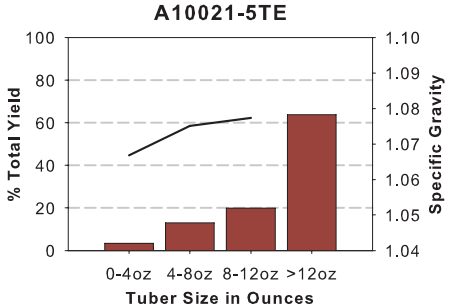
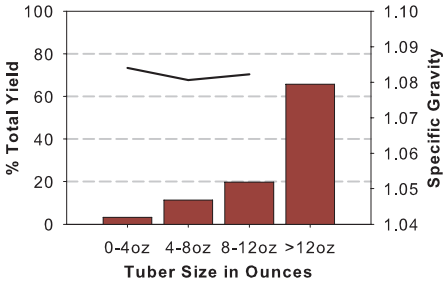


AO02183-2



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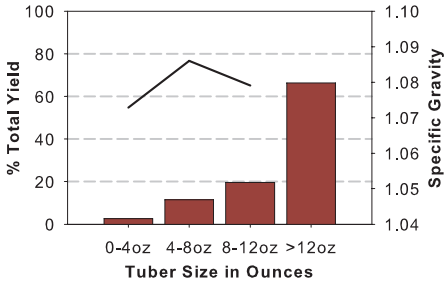

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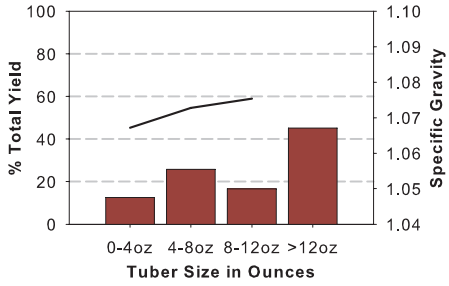

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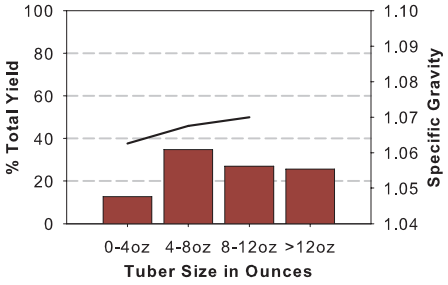

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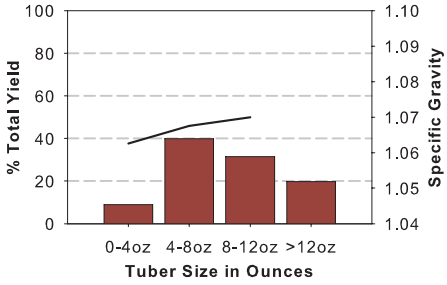
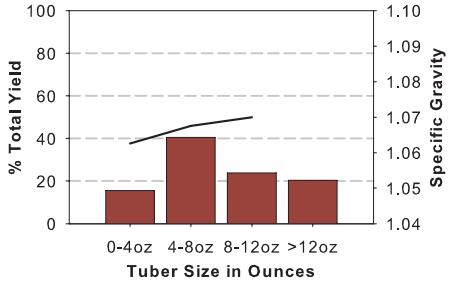
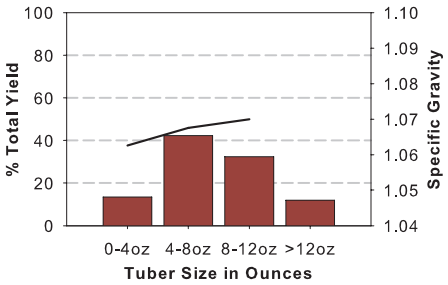


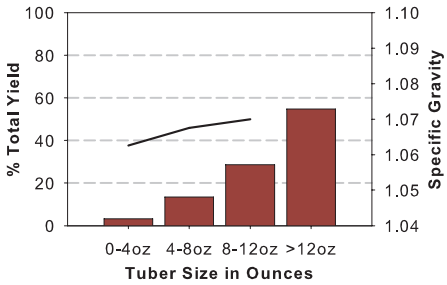
CO10091-1RU



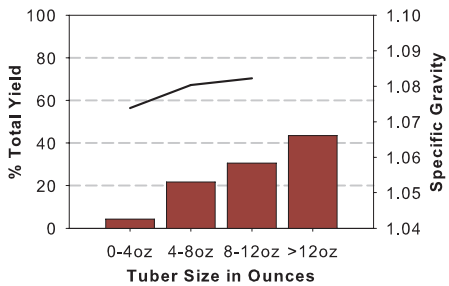
COTX05095-2Ru/Y

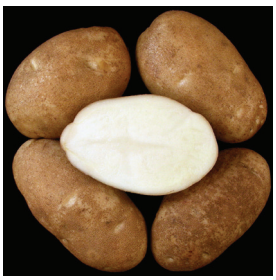
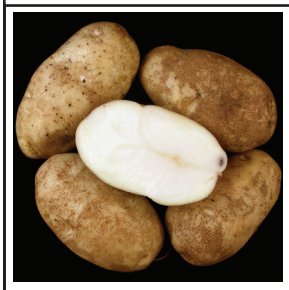
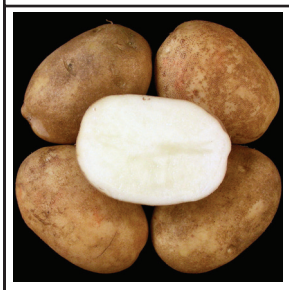


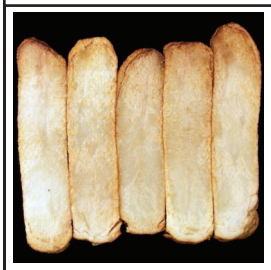
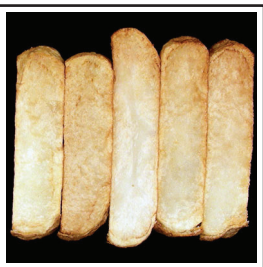
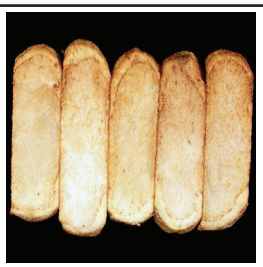
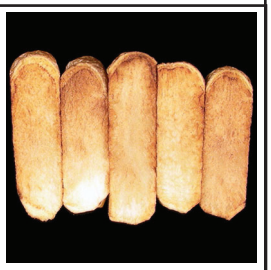
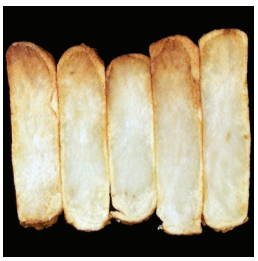
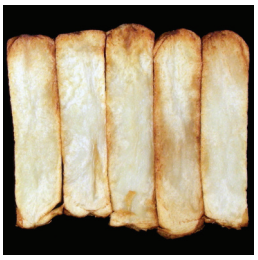
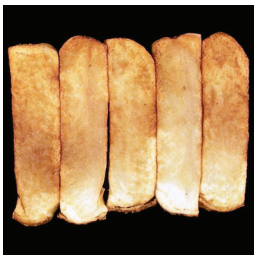
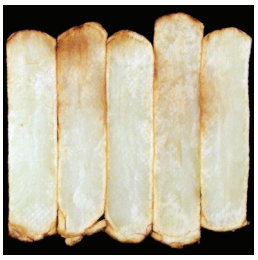
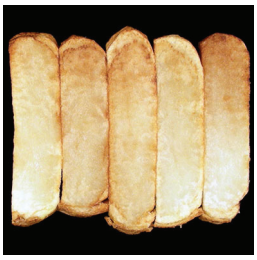
OR12133-10

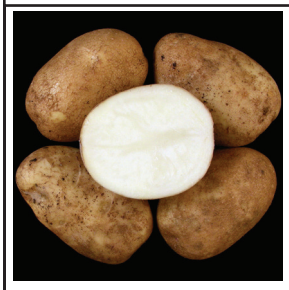


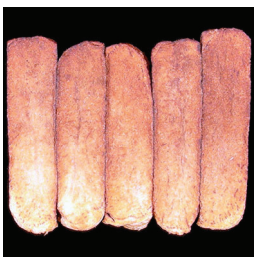
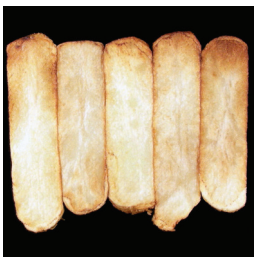
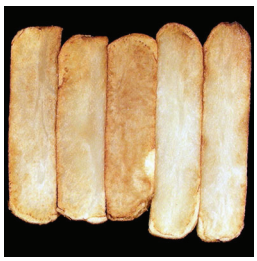
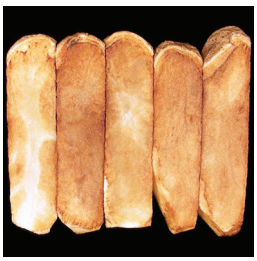
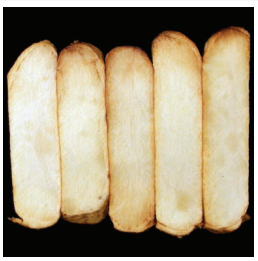
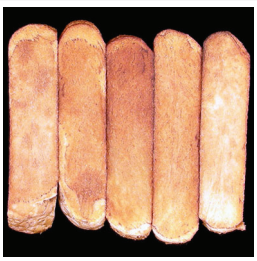
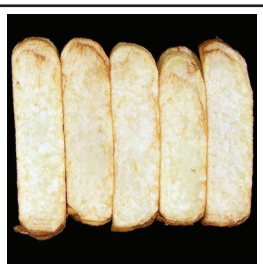
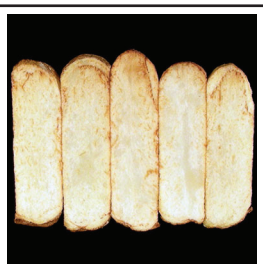
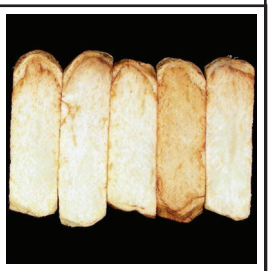
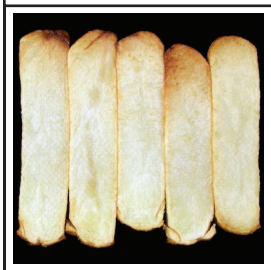
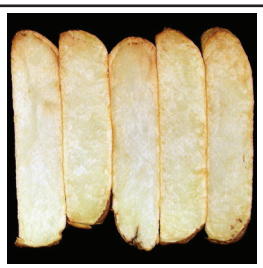
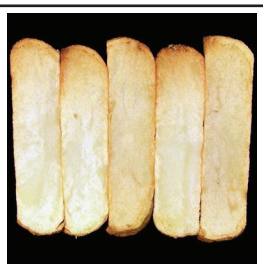
POR12NCK50-1

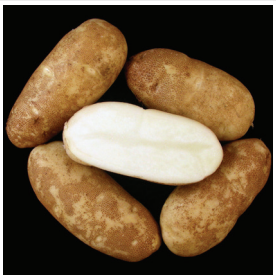
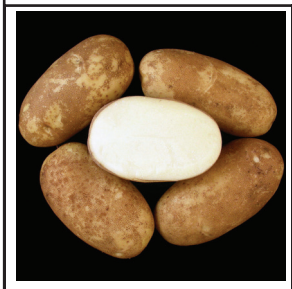
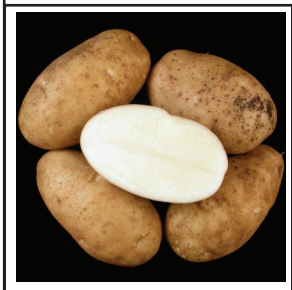


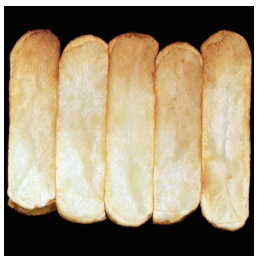
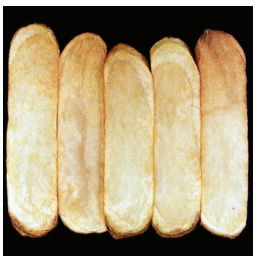
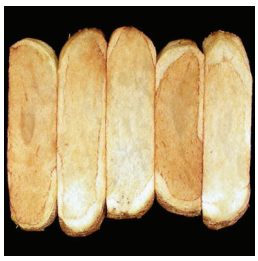
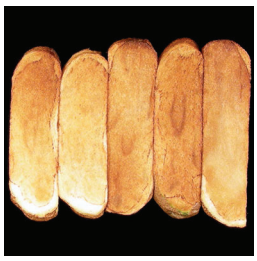
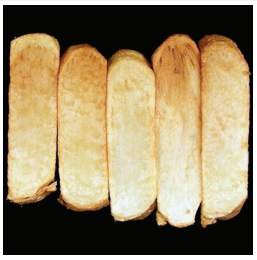
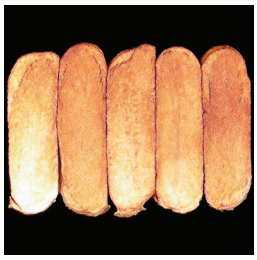
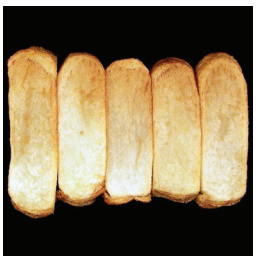
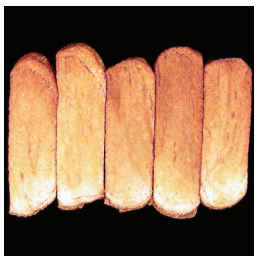
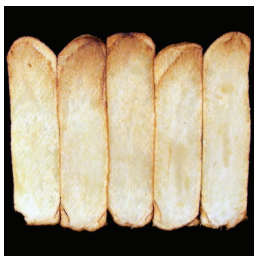
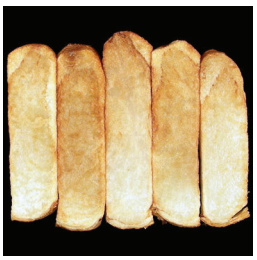
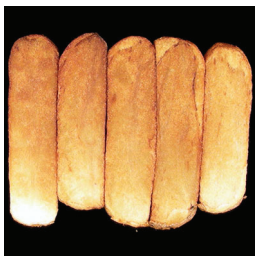
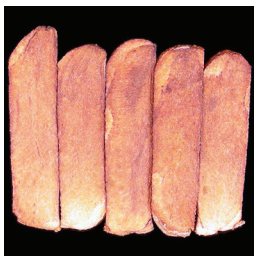
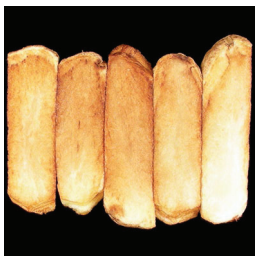
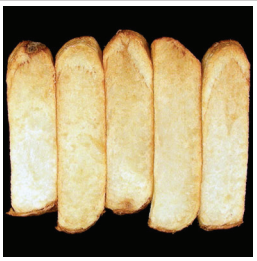
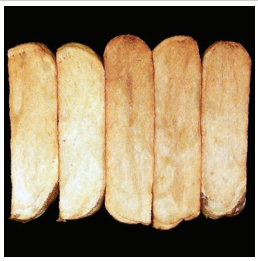
Tubers	WA Late Harvest Regional Trial Comments
Ranger Russet	
	**Tubers:** Oblong to long tubers. Good skin set; moderate eye depth. **Fry color:** At harvest= light, uniform; 48°F = light, uniform; 44°F = light,non-uniform; 40°F = relatively dark, uniform; Reconditioned = relatively dark, non-uniform.
Russet Burbank	
	**Tubers:** Oblong to long tubers. Good skin set; moderate eye depth. **Fry color:** At harvest= light, non-uniform; 48°F = relatively dark, non-uniform; 44°F = relatively dark,non-uniform; 40°F = unacceptably dark uniform; Reconditioned = relatively dark, non-uniform.
A07061-6	
	**Tubers:** Round to oblong tubers. Good skin set; shallow eyes. **Fry color:** At harvest= light, non-uniform; 48°F = relatively dark, uniform; 44°F = relatively dark,uniform; 40°F = unacceptably dark uniform; Reconditioned = unacceptably dark, uniform.
A071012-4BF	
	**Tubers:** Oblong tubers. Good skin set; shallow eyes. **Fry color:** At harvest= light, uniform; 48°F = relatively dark, uniform; 44°F = relatively dark,non-uniform; 40°F = unacceptably dark uniform; Reconditioned = relatively dark, non-uniform.
A07769-4	
	**Tubers:** Oblong tubers. Fair skin set; shallow eyes. **Fry color:** At harvest= light, uniform; 48°F = light, uniform; 44°F = light,uniform; 40°F = relatively dark, uniform; Reconditioned = relatively dark, non-uniform.

Initial Fries	48º F Storage	44º F Storage	40º F Storage	40º F Recon.
Ranger Russet				
				
Russet Burbank				
				
A07061-6				
				
A071012-4BF				
				
A07769-4				
				

Tubers	WA Late Harvest Regional Trial Comments
A08422-4VRsto	
	**Tubers:** Oblong tubers. Good skin set; shallow eyes. **Fry color:** At harvest= light, non-uniform; 48°F = relatively dark, non-uniform; 44°F = relatively dark,non-uniform; 40°F = unnaceptably dark, uniform; Reconditioned = unacceptably dark, uniform.
A08433-4VR	
	**Tubers:** Oblong tubers. Good skin set; shallow eyes. **Fry color:** At harvest= light, uniform; 48°F = relatively dark, uniform; 44°F = relatively dark,uniform; 40°F = unnaceptably dark, uniform; Reconditioned = relatively dark, uniform.
A10021-5TE	
	**Tubers:** Oblong tubers. Good skin set; shallow eyes. **Fry color:** At harvest= light, uniform; 48°F = light, uniform; 44°F = light,uniform; 40°F = relatively dark, uniform; Reconditioned = relatively dark, uniform.
AO02183-2	
	**Tubers:** Oblong tubers. Good skin set; shallow eyes. **Fry color:** At harvest= light, uniform; 48°F = light, uniform; 44°F = light,uniform; 40°F = light, uniform; Reconditioned = light uniform.
AOR07781-5	
	**Tubers:** Oblong tubers. Good skin set; moderate eye depth. **Fry color:** At harvest= light, non-uniform; 48°F = light, uniform; 44°F = light,uniform; 40°F = relatively dark, uniform; Reconditioned = light, non-uniform.

Initial Fries	48º F Storage	44º F Storage	40º F Storage	40º F Recon.
A08422-4VRsto				
				
A08433-4VR				
				
A10021-5TE				
				
AO02183-2				
				
AOR07781-5				
				

Tubers	WA Late Harvest Regional Trial Comments
CO09205-2RU	
	**Tubers:** Oblong to long tubers. Good skin set; moderate eye depth. **Fry color:** At harvest= light, non-uniform; 48°F = light, non-uniform; 44°F = light,uniform; 40°F = relatively dark, uniform; Reconditioned = relatively dark, non-uniform.
CO10087-4RU	
	**Tubers:** Oblong tubers. Good skin set; shallow eyes. **Fry color:** At harvest= light, non-uniform; 48°F = light, non-uniform; 44°F = light,non-uniform; 40°F = relatively dark, non-uniform; Reconditioned = relatively dark, non-uniform.
CO10091-1RU	
	**Tubers:** Round to oblong tubers. Good skin set; shallow eyes. **Fry color:** At harvest= light, non-uniform; 48°F = light, non-uniform; 44°F = light,non-uniform; 40°F = relatively dark, non-uniform; Reconditioned = light, non-uniform.
OR12133-10	
	**Tubers:** Round to oblong tubers. Good skin set; shallow eyes. **Fry color:** At harvest= light, uniform; 48°F = light, uniform; 44°F = relatively dark,non-uniform; 40°F = unacceptably dark, uniform; Reconditioned = relatively dark, non-uniform.
POR12NCK50-1	
	**Tubers:** Oblong tubers. Fair skin set; moderate eye depth. **Fry color:** At harvest= light, non-uniform; 48°F = light, uniform; 44°F = light,non-uniform; 40°F = relatively dark, non-uniform; Reconditioned = relatively dark, non-uniform.

Initial Fries	48º F Storage	44º F Storage	40º F Storage	40º F Recon.
CO09205-2RU				
				
CO10087-4RU				
				
CO10091-1RU				
				
OR12133-10				
				
POR12NCK50-1				
				

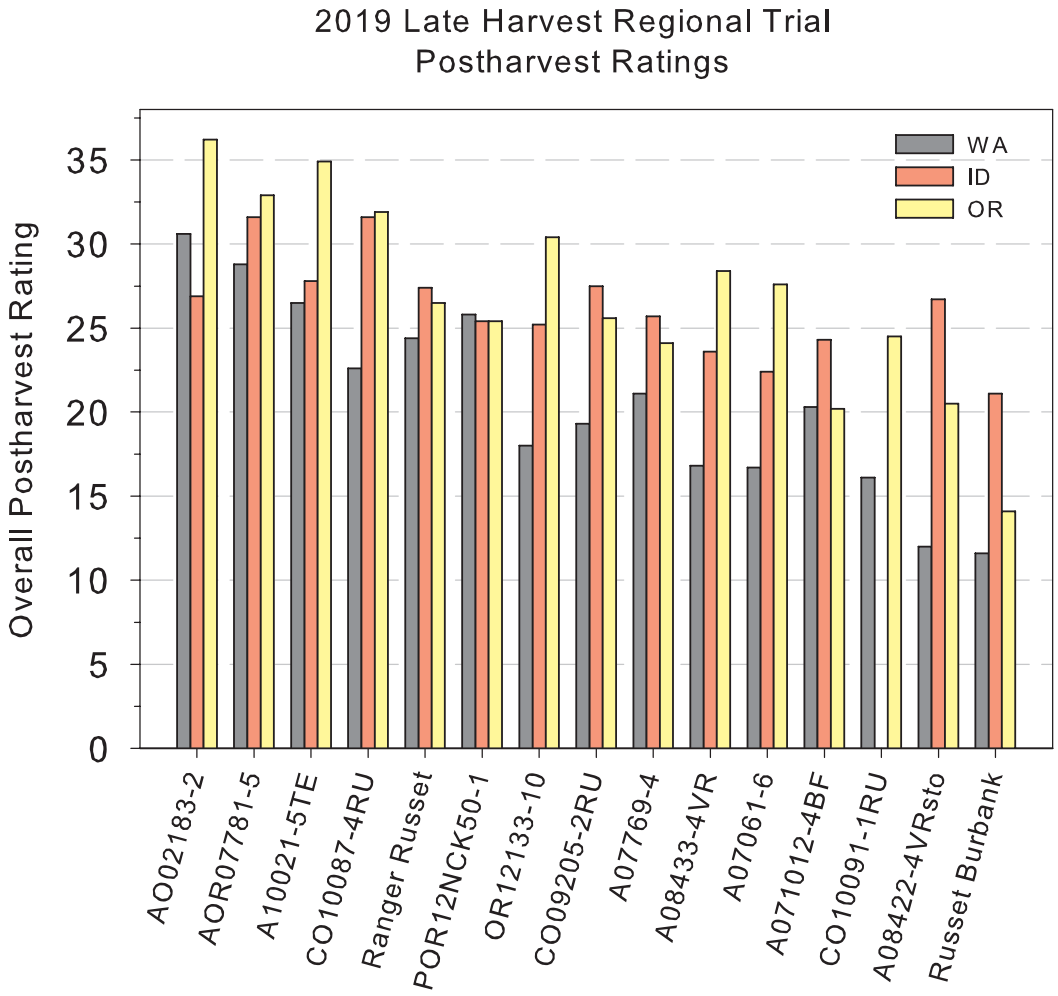
2019 Late Harvest Regional Trial

Accumulated Total Postharvest Ratings of Clones

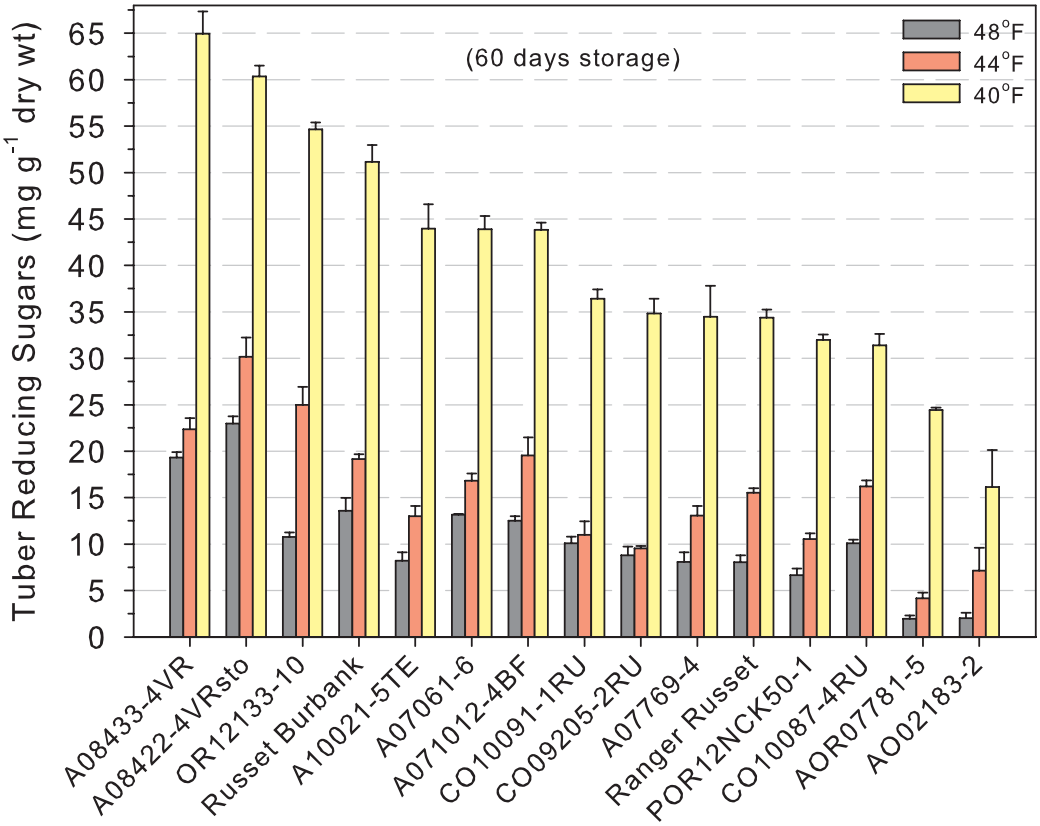
Clone	WA Rating Total §	WA Discard §§	ID Rating Total §	ID Discard §§	OR Rating Total §	OR Discard §§	3 State av. Rating Total
9 AO02183-2	30.6		26.9	SG	36.2		31.2
10 AOR07781-5	28.8		31.6		32.9		31.1
8 A10021-5TE	26.5	SG	27.8		34.9		29.7
12 CO10087-4RU	22.6		31.6		31.9		28.7
1 Ranger Russet	24.4		27.4		26.5		26.1
15 POR12NCK50-1	25.8		25.4	SG	25.4		25.5
14 OR12133-10	18.0	40°F	25.2	SG	30.4		24.5
11 CO09205-2RU	19.3	SG	27.5	SG	25.6	SG	24.1
5 A07769-4	21.1	SG	25.7	SG	24.1	SG	23.6
7 A08433-4VR	16.8	SG, 40°F	23.6	40°F	28.4	40°F	22.9
3 A07061-6	16.7	SG, 40°F	22.4	SG, 40°F	27.6		22.2
4 A071012-4BF	20.3	40°F	24.3	40°F	20.2	40°F	21.6
13 CO10091-1RU	16.1		No Sample		24.5	SG	20.3
6 A08422-4VRsto	12.0	SG, 40°F	26.7	40°F	20.5	40°F	19.7
2 Russet Burbank	11.6	SG, 40°F	21.1	SG, 40°F	14.1	SG, 40°F	15.6
	20.7		26.2		26.9		24.5

§ maximum rating possible = 38

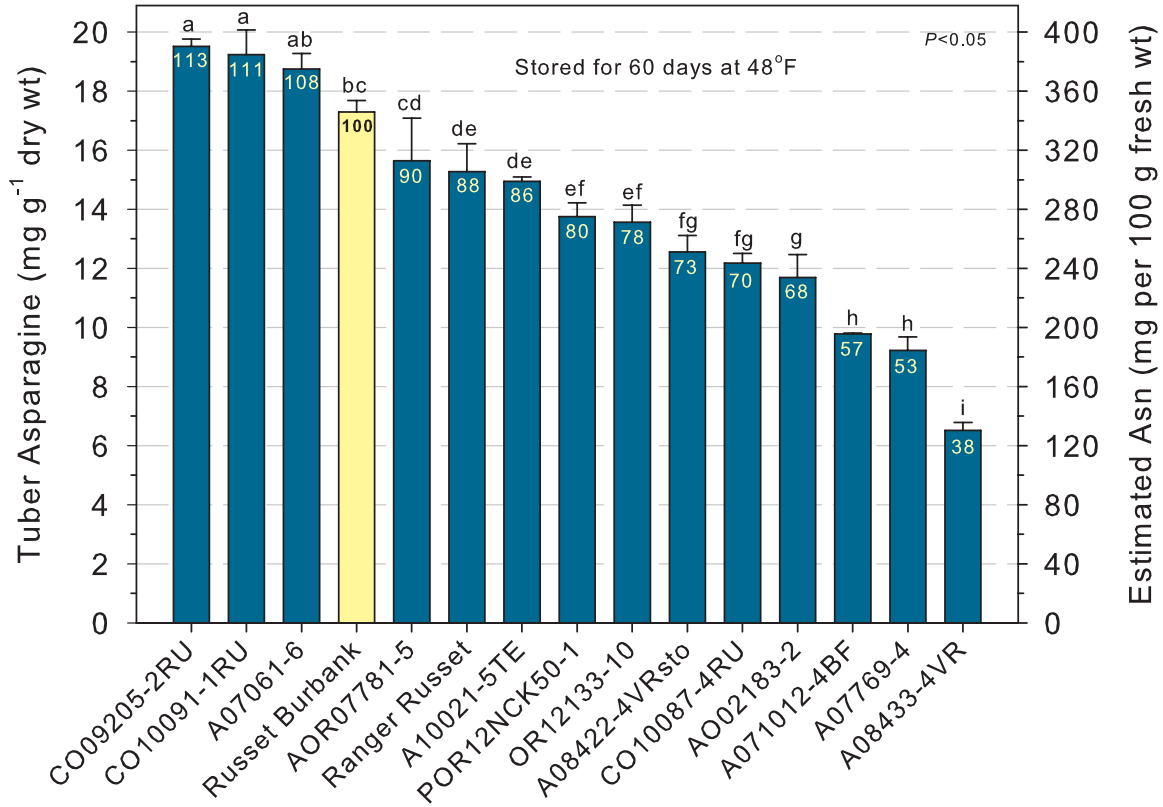
§§ Values for the indicated evaluation are lower than the rejection level.



2019 WA LRT Reducing Sugars



2019 WA LRT Tuber Asparagine Content



2019 Late Harvest Regional Trial

Prior to Storage

Clone	PHOTOVOLT READING stem	bud	av	rtg §	DIFF	USDA COLOR	SPECIFIC GRAVITY	rtg
Washington								
1 Ranger Russet	37.7	45.8	41.7	**5+**	8.9	0	1.076	**1**
2 Russet Burbank	36.0	49.8	42.9	**5-**	13.8	0	1.075	**0**
3 A07061-6	33.9	47.9	40.9	**5-**	14.0	0	1.070	**0**
4 A071012-4BF	44.9	47.7	46.2	**5+**	8.8	0	1.087	**5**
5 A07769-4	47.2	50.5	48.8	**5+**	4.9	0	1.074	**0**
6 A08422-4VRsto	40.9	57.3	49.1	**5-**	16.5	0	1.074	**0**
7 A08433-4VR	35.5	39.2	37.3	**4+**	6.0	0	1.064	**0**
8 A10021-5TE	57.2	56.0	56.6	**5+**	4.9	0	1.073	**0**
9 AO02183-2	58.4	63.9	61.2	**5+**	6.8	0	1.079	**2**
10 AOR07781-5	41.1	50.9	46.0	**5-**	9.9	0	1.080	**3**
11 CO09205-2RU	37.4	49.6	43.5	**5-**	12.2	0	1.067	**0**
12 CO10087-4RU	43.9	62.7	53.3	**5-**	18.8	0	1.084	**5**
13 CO10091-1RU	40.3	55.8	48.0	**5-**	15.5	0	1.076	**1**
14 OR12133-10	54.5	61.2	57.9	**5+**	7.4	0	1.077	**1**
15 POR12NCK50-1	41.1	51.8	46.4	**5-**	10.8	0	1.081	**4**
		LSD 0.05	*2.9*		*5.1*		*0.005*	
Average	43.3	52.7	48.0		10.6	0	1.076	
Idaho								
1 Ranger Russet	36.4	38.7	37.5	**4+**	4.9	0	1.079	**2**
2 Russet Burbank	39.7	41.3	40.5	**5+**	5.0	0	1.070	**0**
3 A07061-6	41.8	47.5	44.6	**5+**	5.9	0	1.071	**0**
4 A071012-4BF	45.3	44.7	44.5	**5+**	3.6	0	1.081	**4**
5 A07769-4	47.7	48.8	48.2	**5+**	2.9	0	1.075	**0**
6 A08422-4VRsto	52.8	58.4	55.6	**5+**	5.6	0	1.085	**5**
7 A08433-4VR	44.4	41.8	43.1	**5+**	5.6	0	1.077	**1**
8 A10021-5TE	52.2	47.3	49.8	**5+**	7.6	0	1.076	**1**
9 AO02183-2	61.2	51.4	56.3	**5-**	9.8	0	1.070	**0**
10 AOR07781-5	43.4	41.2	42.3	**5+**	6.3	0	1.079	**2**
11 CO09205-2RU	41.2	43.9	42.5	**5+**	4.8	0	1.075	**0**
12 CO10087-4RU	46.5	50.4	48.4	**5+**	4.5	0	1.081	**4**
13 CO10091-1RU			No Sample				No Sample	
14 OR12133-10	43.7	47.0	45.4	**5+**	5.1	0	1.072	**0**
15 POR12NCK50-1	50.4	45.0	47.7	**5+**	6.9	0	1.075	**0**
		LSD 0.05	*3.8*		*3.5*		*0.004*	
Average	46.2	46.2	46.2		5.6	0	1.076	
Oregon								
1 Ranger Russet	48.9	48.2	48.6	**5+**	3.4	0	1.078	**2**
2 Russet Burbank	33.8	46.9	40.4	**4-**	13.1	0	1.070	**0**
3 A07061-6	40.6	46.2	43.4	**5+**	6.8	0	1.077	**1**
4 A071012-4BF	36.1	52.8	45.1	**5-**	15.3	0	1.089	**4**
5 A07769-4	48.4	48.5	48.5	**5+**	3.1	0	1.072	**0**
6 A08422-4VRsto	44.2	53.2	48.7	**5-**	9.1	0	1.078	**2**
7 A08433-4VR	54.0	53.1	53.5	**5+**	5.9	0	1.091	**4**
8 A10021-5TE	64.8	62.7	63.7	**5+**	3.8	0	1.084	**5**
9 AO02183-2	56.4	57.7	57.1	**5+**	3.6	0	1.087	**5**
10 AOR07781-5	51.3	52.0	51.6	**5+**	5.0	0	1.090	**4**
11 CO09205-2RU	47.3	53.9	50.6	**5+**	7.4	0	1.071	**0**
12 CO10087-4RU	50.5	54.6	52.6	**5+**	4.8	0	1.084	**5**
13 CO10091-1RU	44.9	50.0	47.4	**5+**	5.2	0	1.070	**0**
14 OR12133-10	51.2	50.8	51.0	**5+**	4.5	0	1.082	**4**
15 POR12NCK50-1	50.3	59.0	54.7	**5-**	9.5	0	1.081	**4**
		LSD 0.05	*2.9*		*3.7*		*0.005*	
Average	48.2	52.6	50.2		6.7	0	1.080	

Date test performed:

Washington	Sept. 20	Sept. 17
Idaho	Sept. 26	Sept. 19
Oregon	Sept. 28	Sept. 26

§ rtg = rating (1-5, 5 is best); av = average Photovolt reading; Diff = Absolute difference between stem and bud Photovolt reading. Stem to bud differences of nine or greater (-) lose one point and differences of less than nine (+) gain one point in the accumulated total postharvest rating.

2019 Late Harvest Regional Trial

Stored at 48°F after Arrival

Clone	FRENCH FRY TASTE PANEL rating	BRUISE POTENTIAL (percent) stem	bud	[color 5=darkest] stem	bud	SOFT ROT INDEX (percent) stem	bud
Washington							
1 Ranger Russet	**3.4**	96	8	3.8	1.2	17	18
2 Russet Burbank	**2.6**	54	8	2.3	1.2	18	17
3 A07061-6	**2.7**	21	0	1.5	1.0	17	16
4 A071012-4BF	**3.3**	92	21	3.5	1.4	13	16
5 A07769-4	**3.1**	42	0	2.0	1.0	23	23
6 A08422-4VRsto	**3.0**	25	8	1.7	1.2	18	19
7 A08433-4VR	**2.8**	13	0	1.3	1.0	13	17
8 A10021-5TE	**3.5**	42	8	2.0	1.2	14	13
9 AO02183-2	**3.6**	21	0	1.4	1.0	8	11
10 AOR07781-5	**3.8**	33	21	1.8	1.5	15	14
11 CO09205-2RU	**3.3**	4	0	1.1	1.0	11	9
12 CO10087-4RU	**3.6**	42	0	1.8	1.0	22	21
13 CO10091-1RU	**3.1**	4	0	1.1	1.0	17	11
14 OR12133-10	**3.0**	88	17	3.3	1.4	19	23
15 POR12NCK50-1	**3.8**	46	4	2.0	1.1	13	18
LSD 0.05	*0.4*	*28*	*14*			*6*	*6*
Average	3.2	41.4	6.4	2.0	1.1	15.9	16.5
Idaho							
1 Ranger Russet	**3.4**	79	13	2.9	1.3	15	12
2 Russet Burbank	**3.1**	13	13	1.3	1.3	22	17
3 A07061-6	**3.4**	13	0	1.3	1.0	9	12
4 A071012-4BF	**3.3**	83	13	3.3	1.3	11	14
5 A07769-4	**3.7**	25	0	1.5	1.0	27	16
6 A08422-4VRsto	**3.7**	33	8	1.8	1.2	17	22
7 A08433-4VR	**3.6**	8	0	1.2	1.0	9	9
8 A10021-5TE	**3.8**	17	0	1.3	1.0	12	12
9 AO02183-2	**3.9**	0	0	1.0	1.0	12	12
10 AOR07781-5	**3.6**	75	17	3.0	1.5	14	16
11 CO09205-2RU	**3.5**	29	4	1.8	1.1	11	9
12 CO10087-4RU	**3.6**	21	4	1.5	1.1	15	16
13 CO10091-1RU	**No Sample**	No Sample		No Sample		No Sample	
14 OR12133-10	**3.2**	38	0	1.8	1.0	10	11
15 POR12NCK50-1	**3.4**	25	4	1.6	1.1	12	12
LSD 0.05	*0.3*	*26*	*13*			*5*	*5*
Average	3.5	32.7	5.4	1.8	1.1	13.9	13.4
Oregon							
1 Ranger Russet	**3.5**	92	8	3.8	1.2	14	18
2 Russet Burbank	**3.1**	75	8	3.2	1.2	16	17
3 A07061-6	**3.6**	29	0	1.7	1.0	8	9
4 A071012-4BF	**3.2**	88	63	3.6	2.3	11	12
5 A07769-4	**3.1**	13	0	1.3	1.0	10	10
6 A08422-4VRsto	**3.5**	13	4	1.3	1.1	9	10
7 A08433-4VR	**3.4**	13	4	1.3	1.1	8	11
8 A10021-5TE	**3.9**	79	21	3.0	1.4	10	11
9 AO02183-2	**4.2**	42	4	1.9	1.1	7	7
10 AOR07781-5	**3.9**	58	29	2.5	1.8	8	11
11 CO09205-2RU	**3.6**	13	0	1.3	1.0	6	7
12 CO10087-4RU	**3.9**	67	0	2.6	1.0	11	10
13 CO10091-1RU	**3.5**	0	0	1.0	1.0	11	6
14 OR12133-10	**3.4**	83	33	3.3	1.7	9	11
15 POR12NCK50-1	**3.4**	71	13	2.8	1.3	6	11
LSD 0.05	*0.5*	*26*	*18*			*3*	*3*
Average	3.5	48.9	12.5	2.3	1.3	9.6	10.7

Date test performed:

Washington	Oct. 16	Oct. 24	Nov. 7
Idaho	Oct. 17	Oct. 26	Nov. 9
Oregon	Oct. 18	Oct. 30	Nov. 15

2019 Late Harvest Regional Trial

Stored at 48°F for 60 Days

Clone	PHOTOVOLT READING stem	bud	average	rtg §	DIFF	USDA COLOR	% REDUCING SUGAR stem	bud	SPROUTING (%)	length (in)
Washington										
1 Ranger Russet	35.5	42.0	38.8	**4+**	7.0	0	1.0	0.7	47	0.25
2 Russet Burbank	23.2	36.3	28.2	**2-**	13.1	2	2.2	0.9	0	
3 A07061-6	26.0	34.7	30.4	**2+**	8.8	1	1.8	1.0	67	0.13
4 A071012-4BF	26.3	33.3	29.8	**2+**	7.2	1	1.8	1.1	53	0.13
5 A07769-4	33.5	39.5	36.5	**4+**	6.9	0	1.1	0.8	36	0.13
6 A08422-4VRsto	19.9	37.0	28.4	**2-**	17.1	2	2.7	0.9	0	
7 A08433-4VR	23.6	31.2	27.4	**2+**	7.6	2	2.1	1.3	13	0.25
8 A10021-5TE	46.3	50.4	48.3	**5+**	5.5	0	0.5	0.5	20	0.50
9 AO02183-2	46.8	46.1	46.5	**5+**	2.4	0	0.5	0.5	27	0.25
10 AOR07781-5	39.7	43.9	41.8	**5+**	4.9	0	0.7	0.6	100	0.75
11 CO09205-2RU	29.1	37.9	33.5	**3-**	9.6	1	1.5	0.8	40	0.50
12 CO10087-4RU	30.3	47.0	38.6	**4-**	16.7	1	1.4	0.5	13	0.75
13 CO10091-1RU	31.0	45.3	38.1	**4-**	14.3	0	1.3	0.6	47	0.25
14 OR12133-10	30.0	38.5	34.2	**3+**	8.5	1	1.4	0.8	93	1.00
15 POR12NCK50-1	37.9	45.9	41.9	**5+**	8.3	0	0.8	0.5	100	0.25
		LSD 0.05	*2.8*		*3.6*				*21*	
Average	31.9	40.6	36.2		9.2	1	1.4	0.8	44	
Idaho										
1 Ranger Russet	38.5	44.3	41.4	**5+**	6.9	0	0.8	0.6	0	
2 Russet Burbank	32.8	38.3	35.6	**4-**	9.3	0	1.1	0.8	0	
3 A07061-6	40.0	35.8	37.9	**4+**	5.4	0	0.7	0.9	13	0.13
4 A071012-4BF	37.5	41.3	40.4	**4+**	3.7	0	0.9	0.7	0	
5 A07769-4	46.1	47.6	46.8	**5+**	3.8	0	0.5	0.5	0	
6 A08422-4VRsto	39.9	47.4	43.6	**5+**	8.0	0	0.7	0.5	0	
7 A08433-4VR	39.1	37.7	38.4	**4+**	4.2	0	0.8	0.8	0	
8 A10021-5TE	49.0	43.7	46.4	**5+**	7.7	0	0.5	0.6	0	
9 AO02183-2	55.5	46.8	51.2	**5+**	8.7	0	0.5	0.5	0	
10 AOR07781-5	51.4	47.2	49.3	**5+**	5.4	0	0.5	0.5	0	
11 CO09205-2RU	40.7	44.6	42.6	**5+**	5.0	0	0.7	0.6	27	0.13
12 CO10087-4RU	45.4	50.7	48.1	**5+**	8.5	0	0.6	0.5	0	
13 CO10091-1RU	No Sample						No Sample		No Sample	
14 OR12133-10	37.8	45.1	41.4	**5+**	7.4	0	0.8	0.6	60	0.25
15 POR12NCK50-1	41.8	40.3	41.1	**5+**	7.9	0	0.7	0.7	0	
		LSD 0.05	*4.2*		*3.7*				*14*	
Average	42.5	43.6	43.1		6.5	0	0.7	0.6	7	
Oregon										
1 Ranger Russet	36.4	38.8	37.6	**4+**	6.0	0	0.9	0.8	93	0.50
2 Russet Burbank	24.6	36.7	30.6	**3-**	12.1	1	2.0	0.9	0	
3 A07061-6	37.3	44.5	40.9	**5+**	7.1	0	0.9	0.6	100	1.50
4 A071012-4BF	31.1	44.2	37.7	**4-**	13.5	0	1.3	0.6	100	0.25
5 A07769-4	35.3	36.1	35.7	**4+**	3.2	0	1.0	0.9	100	0.25
6 A08422-4VRsto	36.5	45.9	41.2	**5-**	9.5	0	0.9	0.5	0	
7 A08433-4VR	43.3	42.5	42.9	**5+**	7.0	0	0.6	0.6	80	0.13
8 A10021-5TE	55.1	52.5	53.8	**5+**	3.7	0	0.5	0.5	73	0.13
9 AO02183-2	51.1	49.5	50.3	**5+**	2.2	0	0.5	0.5	100	0.25
10 AOR07781-5	47.8	49.5	48.6	**5+**	2.4	0	0.5	0.5	100	0.75
11 CO09205-2RU	39.8	44.2	42.0	**5+**	4.6	0	0.7	0.6	100	0.50
12 CO10087-4RU	42.5	50.3	46.4	**5+**	7.8	0	0.6	0.5	80	0.50
13 CO10091-1RU	40.8	44.7	42.8	**5+**	4.7	0	0.7	0.6	80	0.25
14 OR12133-10	38.0	40.8	39.4	**4+**	6.9	0	0.8	0.7	100	2.00
15 POR12NCK50-1	39.0	47.2	43.1	**5-**	9.5	0	0.8	0.5	67	0.25
		LSD 0.05	*3.3*		*3.6*				*16*	
Average	39.9	44.5	42.2		6.7	0	0.9	0.6	78	

Date test performed:

Washington	Nov. 29	Nov. 29	Dec. 15
Idaho	Dec. 5	Dec. 5	Dec. 15
Oregon	Dec. 10	Dec. 10	Dec. 15

§ rtg = rating (1-5, 5 is best); av = average Photovolt reading; Diff = Absolute difference between stem and bud Photovolt reading. Stem to bud differences of nine or greater (-) lose one point and differences of less than nine (+) gain one point in the accumulated total postharvest rating.

2019 Late Harvest Regional Trial

Stored at 44°F for 60 Days

Clone	PHOTOVOLT READING stem	bud	average	rtg §	DIFF	USDA COLOR	% REDUCING SUGAR stem	bud
Washington								
1 Ranger Russet	31.9	43.3	37.6	**4-**	11.4	0	1.2	0.6
2 Russet Burbank	18.3	31.8	25.0	**2-**	13.5	3	3.0	1.2
3 A07061-6	25.3	33.8	29.5	**2+**	8.6	1	1.9	1.1
4 A071012-4BF	18.6	28.2	23.6	**1-**	9.5	3	2.9	1.6
5 A07769-4	27.5	34.6	31.1	**3+**	7.6	1	1.6	1.0
6 A08422-4VRsto	13.4	26.8	20.1	**1-**	13.4	4	4.1	1.7
7 A08433-4VR	20.5	26.6	23.5	**1+**	6.7	2	2.6	1.8
8 A10021-5TE	38.1	41.9	40.0	**4+**	5.2	0	0.8	0.7
9 AO02183-2	44.1	48.4	46.3	**5+**	4.9	0	0.6	0.5
10 AOR07781-5	40.5	46.0	43.3	**5+**	6.0	0	0.7	0.5
11 CO09205-2RU	32.5	38.1	35.3	**3+**	7.5	0	1.2	0.8
12 CO10087-4RU	23.8	40.6	32.2	**3-**	17.2	2	2.1	0.7
13 CO10091-1RU	27.4	43.3	35.3	**3-**	15.8	1	1.7	0.6
14 OR12133-10	20.0	32.2	26.1	**2-**	12.3	2	2.7	1.2
15 POR12NCK50-1	31.4	44.8	38.1	**4-**	13.4	0	1.3	0.6
		LSD 0.05	3.1		4.2			
Average	27.6	37.4	32.5		10.2	1	1.9	1.0
Idaho								
1 Ranger Russet	37.1	42.2	39.7	**4+**	8.7	0	0.9	0.6
2 Russet Burbank	27.7	34.6	31.1	**3+**	8.3	1	1.6	1.0
3 A07061-6	30.6	28.5	29.5	**2+**	3.1	1	1.3	1.5
4 A071012-4BF	20.9	29.9	25.2	**2-**	9.2	2	2.5	1.4
5 A07769-4	33.6	37.3	35.4	**3+**	4.6	0	1.1	0.9
6 A08422-4VRsto	24.6	34.7	29.7	**2-**	10.1	1	2.0	1.0
7 A08433-4VR	28.3	29.1	28.7	**2+**	1.9	1	1.6	1.5
8 A10021-5TE	37.7	33.8	35.7	**4+**	7.2	0	0.8	1.1
9 AO02183-2	50.7	42.0	46.3	**5+**	8.7	0	0.5	0.7
10 AOR07781-5	43.6	41.8	42.7	**5+**	4.0	0	0.6	0.7
11 CO09205-2RU	40.1	39.5	39.8	**4+**	4.5	0	0.7	0.8
12 CO10087-4RU	36.7	43.6	40.2	**4+**	8.2	0	0.9	0.6
13 CO10091-1RU			No Sample				No Sample	
14 OR12133-10	31.3	37.6	34.4	**3+**	7.8	0	1.3	0.8
15 POR12NCK50-1	36.4	33.6	35.0	**3+**	3.8	0	0.9	1.1
		LSD 0.05	*3.5*		*3.3*			
Average	34.2	36.3	35.2		6.4	0	1.2	1.0
Oregon								
1 Ranger Russet	37.5	44.8	41.1	**5-**	9.3	0	0.8	0.6
2 Russet Burbank	20.4	33.3	26.8	**2-**	12.9	2	2.6	1.1
3 A07061-6	39.2	38.5	38.9	**4+**	3.6	0	0.8	0.8
4 A071012-4BF	21.5	40.1	30.9	**3-**	18.9	2	2.4	0.7
5 A07769-4	31.4	31.9	31.6	**3+**	4.7	0	1.3	1.2
6 A08422-4VRsto	26.0	35.8	30.9	**3-**	9.8	1	1.8	0.9
7 A08433-4VR	29.7	32.3	31.0	**3+**	8.3	1	1.4	1.2
8 A10021-5TE	49.7	50.7	50.2	**5+**	2.9	0	0.5	0.5
9 AO02183-2	46.2	47.0	46.6	**5+**	3.3	0	0.5	0.5
10 AOR07781-5	42.2	42.6	42.4	**5+**	4.5	0	0.6	0.6
11 CO09205-2RU	30.4	36.6	33.5	**3+**	7.0	1	1.4	0.9
12 CO10087-4RU	35.9	42.9	39.4	**4+**	7.4	0	0.9	0.6
13 CO10091-1RU	33.8	43.3	38.6	**4-**	9.7	0	1.1	0.6
14 OR12133-10	39.9	40.3	40.1	**4+**	6.0	0	0.7	0.7
15 POR12NCK50-1	27.1	33.1	30.1	**2+**	6.5	1	1.7	1.1
		LSD 0.05	*3.6*		*3.6*			
Average	34.1	39.5	36.8		7.6	1	1.2	0.8

Date test performed:

Washington	Nov. 30	Nov. 30
Idaho	Dec. 6	Dec. 6
Oregon	Dec. 12	Dec. 12

§ rtg = rating (1-5, 5 is best); av = average Photovolt reading; Diff = Absolute difference between stem and bud Photovolt reading. Stem to bud differences of nine or greater (-) lose one point and differences of less than nine (+) gain one point in the accumulated total postharvest rating.

2019 Late Harvest Regional Trial

Stored at 40°F for 60 Days and Reconditioned

		PHOTOVOLT(60 Days at 40°F)						PHOTOVOLT AFTER RECONDITIONING (21 days at 60°F)				
Clone	SPROUTING (%)	stem	bud	average	rtg §	DIFF	USDA COLOR	stem	bud	average	DIFF	USDA COLOR
Washington												
1 Ranger Russet	0	19.1	27.3	23.2	**1**	8.4	3	24.0	32.7	28.4	9.3	2
2 Russet Burbank	0	12.2	17.9	15.1	**0**	5.7	4	15.4	25.7	20.6	10.4	3
3 A07061-6	0	12.3	20.5	16.4	**0**	8.2	4	16.2	22.6	19.4	6.3	3
4 A071012-4BF	0	13.4	17.7	15.7	**0**	5.2	4	20.8	31.9	26.3	11.1	2
5 A07769-4	0	21.1	24.3	22.7	**1**	3.8	2	21.9	29.9	25.9	9.0	2
6 A08422-4VRsto	0	11.1	18.8	15.0	**0**	7.7	4	12.8	20.4	16.6	7.5	4
7 A08433-4VR	0	11.6	14.2	12.9	**0**	2.7	4	20.0	22.3	21.2	5.9	2
8 A10021-5TE	0	18.0	23.3	20.7	**1**	5.2	3	24.3	31.1	27.7	6.9	2
9 AO02183-2	0	28.5	33.6	31.0	**3**	6.8	1	40.2	46.9	43.5	7.4	0
10 AOR07781-5	0	23.6	29.0	26.3	**2**	5.6	2	30.3	39.9	35.1	9.5	1
11 CO09205-2RU	0	20.2	27.1	23.6	**1**	7.1	2	20.8	33.8	27.3	13.0	2
12 CO10087-4RU	0	16.7	27.8	22.2	**1**	11.1	3	22.0	36.4	29.2	14.8	2
13 CO10091-1RU	0	16.5	25.9	21.2	**1**	9.4	3	24.7	37.8	31.2	13.1	1
14 OR12133-10	0	11.1	15.0	13.1	**0**	3.9	4	21.8	33.9	27.8	12.2	2
15 POR12NCK50-1	0	17.4	27.5	22.5	**1**	10.1	3	21.0	35.0	28.0	13.9	2
LSD 0.05	*ns*			*2.2*		*3.0*				*3.3*	*4.1*	
Average	0	16.8	23.3	20.1		6.7	3	22.4	32.0	27.2	10.0	2
Idaho												
1 Ranger Russet	0	19.1	22.7	20.9	**1**	5.6	3	25.6	35.3	30.5	10.6	1
2 Russet Burbank	0	16.5	16.6	16.5	**0**	2.4	3	20.9	30.3	25.6	9.5	2
3 A07061-6	0	16.0	16.4	16.2	**0**	2.5	3	19.2	19.8	19.5	2.6	3
4 A071012-4BF	0	16.3	18.3	17.5	**0**	2.4	3	18.6	25.2	21.9	6.6	3
5 A07769-4	0	23.2	25.1	24.2	**1**	4.2	2	29.6	34.3	32.0	6.1	1
6 A08422-4VRsto	0	11.1	17.0	14.0	**0**	5.8	4	16.8	22.7	19.7	6.0	3
7 A08433-4VR	0	18.0	18.7	18.3	**0**	2.1	3	22.7	21.9	22.3	2.4	2
8 A10021-5TE	0	23.7	22.4	23.1	**1**	4.3	2	24.2	24.1	24.1	3.5	2
9 AO02183-2	0	30.6	29.1	29.9	**2**	7.8	0	49.2	46.8	48.0	4.9	0
10 AOR07781-5	0	29.3	33.7	31.5	**3**	4.9	1	42.6	41.1	41.8	5.7	0
11 CO09205-2RU	0	26.1	23.3	24.7	**2**	3.7	1	28.2	30.6	29.4	5.2	1
12 CO10087-4RU	0	24.0	28.6	26.3	**2**	5.9	2	23.5	28.8	26.2	5.8	2
13 CO10091-1RU	0	No Sample						No Sample				
14 OR12133-10	0	17.0	23.0	20.0	**1**	6.1	3	27.7	34.9	31.3	7.3	1
15 POR12NCK50-1	0	21.2	22.6	21.9	**1**	4.5	2	22.4	23.9	23.2	2.7	2
LSD 0.05	*ns*			*2.6*		*2.6*				*3.8*	*3.8*	
Average	0	20.9	22.7	21.8		4.4	2	26.5	30.0	28.2	5.6	2
Oregon												
1 Ranger Russet	0	16.2	27.2	21.7	**1**	11.0	3	21.1	39.0	30.0	17.9	2
2 Russet Burbank	0	12.1	18.8	15.5	**0**	6.7	4	16.2	26.5	21.3	10.2	3
3 A07061-6	25	21.7	25.7	23.7	**1**	4.7	2	24.1	34.2	29.1	12.3	2
4 A071012-4BF	0	12.1	21.4	16.7	**0**	9.7	4	20.0	36.6	28.3	16.6	2
5 A07769-4	0	20.9	20.9	20.9	**1**	4.6	2	23.1	25.0	24.0	4.3	2
6 A08422-4VRsto	0	13.3	20.4	16.9	**0**	7.1	4	14.4	23.9	19.1	9.5	4
7 A08433-4VR	0	17.9	17.9	17.9	**0**	4.2	3	27.4	26.6	27.0	5.8	1
8 A10021-5TE	0	31.3	33.3	32.3	**3**	4.0	0	32.8	38.5	35.7	6.4	0
9 AO02183-2	0	39.0	41.3	40.2	**4**	5.1	0	47.5	49.6	48.5	4.3	0
10 AOR07781-5	0	27.6	31.5	29.6	**2**	4.9	1	33.9	45.5	39.7	12.0	0
11 CO09205-2RU	0	19.5	26.4	22.9	**1**	7.0	2	20.7	30.2	25.4	9.8	2
12 CO10087-4RU	0	19.9	26.9	23.4	**1**	7.9	2	22.9	31.6	27.2	9.3	2
13 CO10091-1RU	0	18.0	28.0	23.0	**1**	10.0	3	22.7	32.3	27.5	9.6	2
14 OR12133-10	42	22.6	29.8	26.2	**2**	8.5	2	26.9	36.6	31.8	10.3	1
15 POR12NCK50-1	0	20.9	29.7	25.3	**2**	8.8	2	21.0	36.8	28.9	15.8	2
LSD 0.05	*14*			*3.2*		*3.4*				*3.9*	*4.2*	
Average	4	20.9	26.6	23.7		7.0	2	25.0	34.0	29.6	10.3	2

Date test performed:

Washington	Dec. 10	Dec. 1	Dec. 13
Idaho	Dec. 10	Dec. 7	Dec. 14
Oregon	Dec. 10	Dec. 13	Dec. 14

DIFF = Absolute difference between bud and stem Photovolt reading.

Entries Retained from the 2018 Trials Currently in the Regional Trial

Harvested fall of 2018 Held at 48°F until December 15 Stored at 44°F until analysis

OR12133-10 and POR12NCK50-1 were advanced from the 2018 Tri-State Trial into the 2019 Regional Trial. Eight clones were retained in the Regional Trial. Clones with an asterisk were mottled or dark in the mid-section and unacceptable by processing standards, despite high photovolt values on the bud and stem ends. When averaged across states, AOR07781-5 (54.2 ref units) and A10021-5TE (53.1 ref units) produced the lightest fries. All entries except A10021-5TE produced unacceptably dark fries from at least one growing location, even though some were very light. The range of average sprout lengths was 0.13 to 1.0 inches.

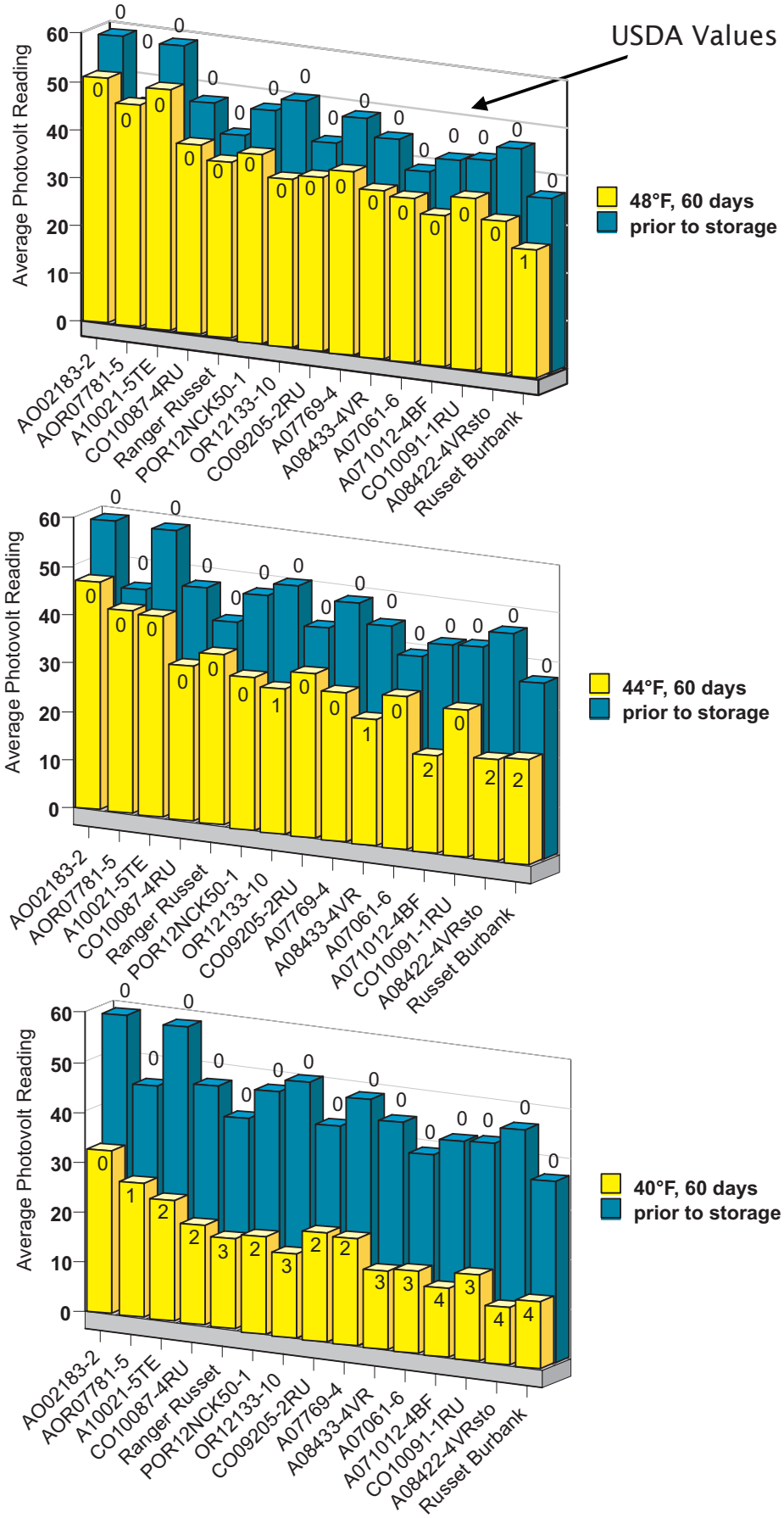
	PHOTOVOLT READING				USDA	% REDUCING SUGAR			Sprouting	
Clone	stem	bud	avg	DIFF	COLOR	stem	bud	avg	percent	length (in.)
Washington										
1 Ranger Russet	26.3	38.1	32.2	11.7	1	1.8	0.8	1.3	100	0.50
2 Russet Burbank	27.8	42.0	34.9	15.1	1	1.6	0.7	1.1	100	0.13
3 A07061-6	32.6	52.7	42.7	20.0	0	1.2	0.5	0.9	100	0.50
4 A071012-4BF *	25.6	40.9	32.8	16.7	1		not estimated		100	0.50
5 A07769-4 *	17.5	36.7	27.1	19.7	3		not estimated		100	0.50
6 A08433-4VR *	29.1	32.0	30.5	9.7	1		not estimated		100	0.25
7 A10021-5TE	46.6	52.6	49.6	8.7	0	0.5	0.5	0.5	100	0.50
8 AO02183-2	41.8	51.0	46.4	10.4	0	0.7	0.5	0.6	100	0.13
9 AOR07781-5	46.3	56.6	51.4	10.4	0	0.5	0.4	0.5	100	0.50
10 CO09205-2Ru	31.9	47.2	39.5	16.1	0	1.2	0.5	0.9	100	0.50
11 OR12133-10 §	59.8	60.5	60.1	3.3	0	0.0	0.0	0.0	100	0.75
12 POR12NCK50-1 §	49.9	52.6	51.2	4.9	0	0.5	0.5	0.5	100	0.13
		LSD 0.05	*3.4*	*5.7*						
Average	36.3	46.9	41.5	12.2	1	0.9	0.5	0.7	100	
Idaho										
1 Ranger Russet	35.1	46.1	40.6	11.0	0	1.0	0.5	0.8	100	0.75
2 Russet Burbank	31.7	46.0	38.8	15.2	0	1.2	0.5	0.9	100	0.13
3 A07061-6	46.7	45.6	46.1	3.6	0	0.5	0.6	0.5	100	0.75
4 A071012-4BF	40.3	46.6	43.5	6.4	0	0.7	0.5	0.6	100	0.25
5 A07769-4	51.1	53.9	52.5	6.5	0	0.5	0.5	0.5	100	0.13
6 A08433-4VR	36.9	35.1	36.0	4.7	0	0.9	1.0	0.9	100	0.50
7 A10021-5TE	58.4	55.7	57.1	5.0	0	0.2	0.5	0.4	100	0.75
8 AO02183-2	50.7	53.3	52.0	5.0	0	0.5	0.6	0.5	100	0.50
9 AOR07781-5	56.5	58.0	57.2	3.2	0	0.5	0.3	0.4	100	0.50
10 CO09205-2Ru	40.5	42.3	41.4	5.8	0	0.7	0.6	0.7	100	0.25
11 OR12133-10 §	34.4	47.5	40.9	13.6	0	1.0	0.5	0.8	100	0.50
12 POR12NCK50-1 §	42.8	53.5	48.1	10.7	0	0.6	0.6	0.6	100	0.50
		LSD 0.05	*4.1*	*4.0*						
Average	43.7	48.6	46.2	7.6	0	0.7	0.6	0.6	100	
Oregon										
1 Ranger Russet	32.9	46.5	39.7	13.6	0	1.1	0.5	0.8	100	0.50
2 Russet Burbank	27.0	49.7	38.4	22.7	1	1.7	0.5	1.1	100	0.13
3 A07061-6	32.6	46.3	39.5	14.6	0	1.2	0.5	0.9	100	0.75
4 A071012-4BF *	40.2	49.8	44.8	9.8	0		not estimated		100	0.25
5 A07769-4 *	20.0	36.9	28.4	17.1	2		not estimated		100	0.50
6 A08433-4VR *	18.5	22.4	20.4	9.3	3		not estimated		100	1.00
7 A10021-5TE	54.0	51.3	52.7	3.7	0	0.5	0.5	0.5	100	0.75
8 AO02183-2	51.0	56.1	53.6	6.2	0	0.5	0.5	0.5	100	0.50
9 AOR07781-5	52.8	55.1	53.9	3.9	0	0.5	0.5	0.5	100	1.00
10 CO09205-2Ru	33.8	47.2	40.5	13.4	0	1.1	0.5	0.8	100	0.25
11 OR12133-10 §	43.6	49.3	46.5	6.3	0	0.6	0.5	0.6	100	0.75
12 POR12NCK50-1 §	51.4	55.2	53.3	5.3	0	0.5	0.5	0.5	100	0.50
		LSD 0.05	*3.7*	*5.1*						
Average	38.2	47.1	42.6	10.5	1	0.9	0.5	0.7	100	

§ Advanced from 2018 Tri-State Trial.
* Procesing quality of entries is unacceptable despite high photovolts. Sugars were not estimated based on photovolt values.

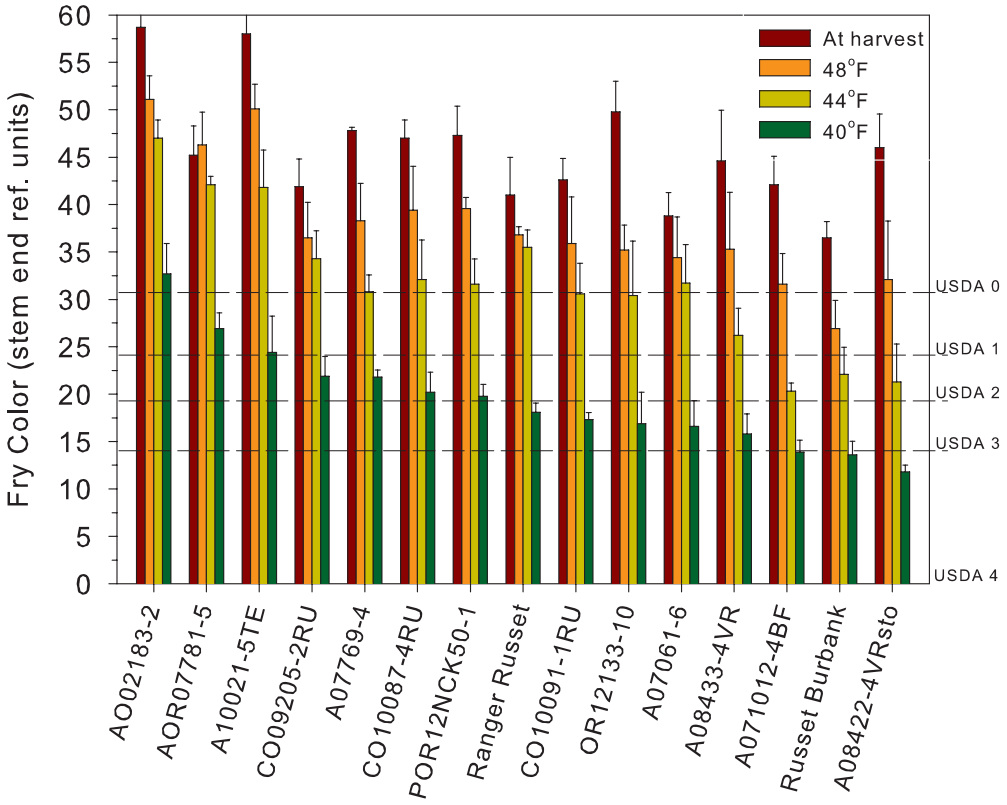
Date test performed:
Washington May 1
Idaho May 2
Oregon May 3

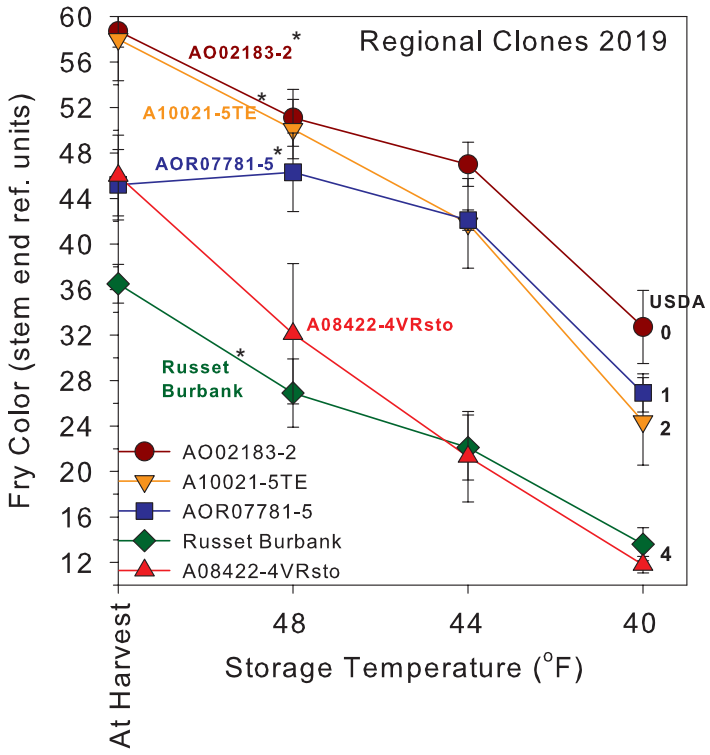
2019 Late Harvest Regional Trial

Regional Trial - 3 State Average of Stem End



2019 Late Harvest Regional Trial

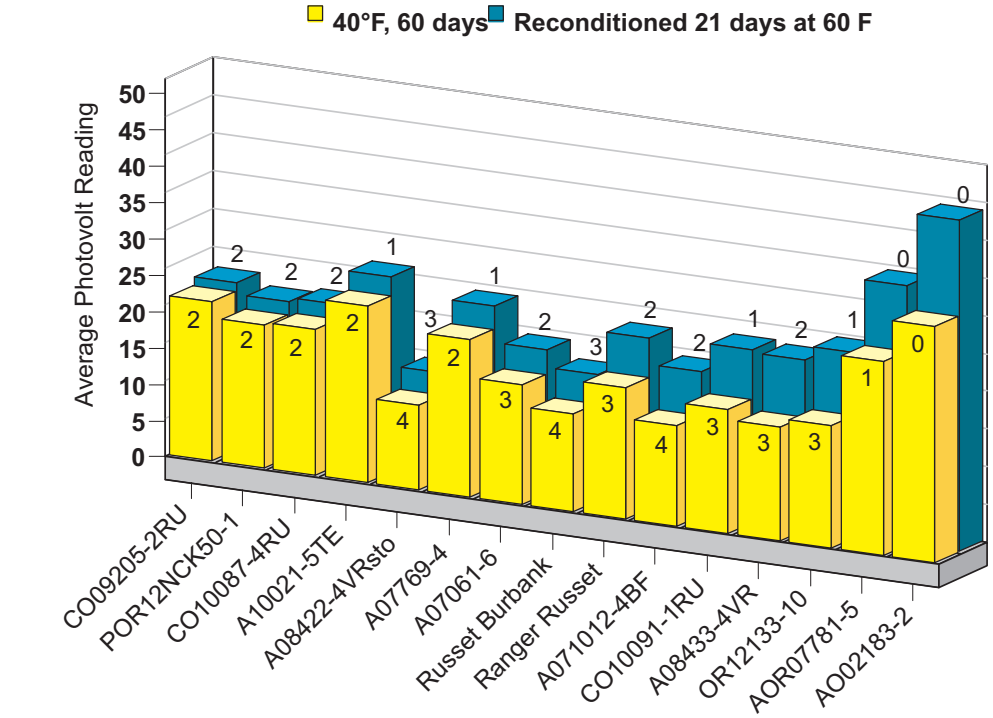


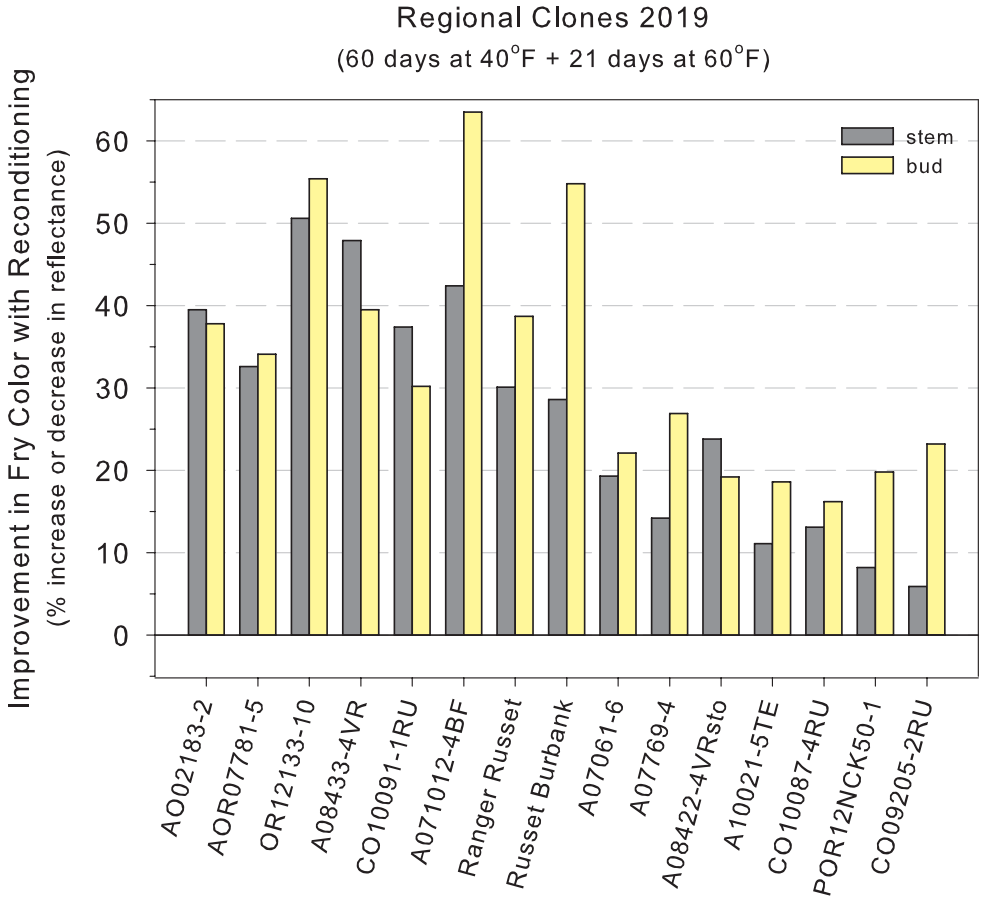


Top: At-harvest and after-storage French fry colors (stem end) of clones in the Regional Trial. Tubers were stored for 60 days at 48, 44 and 40°F. The clones are ranked from best to worst based on fry color of the 40°F-stored tubers. High reflectance values indicate light colored fries.

Bottom: Line graph depicting the effects of storage temperature on change in French fry processing quality (stem end fry color) of the most cold sweetening resistant (AO02183-2, A10021-5TE, and CO09036-2RU) and susceptible (A08422-4VRsto, Russet Burbank) clones in the Regional Trial. *Indicates similar performance of the clones last year.

2019 Late Harvest Regional Trial



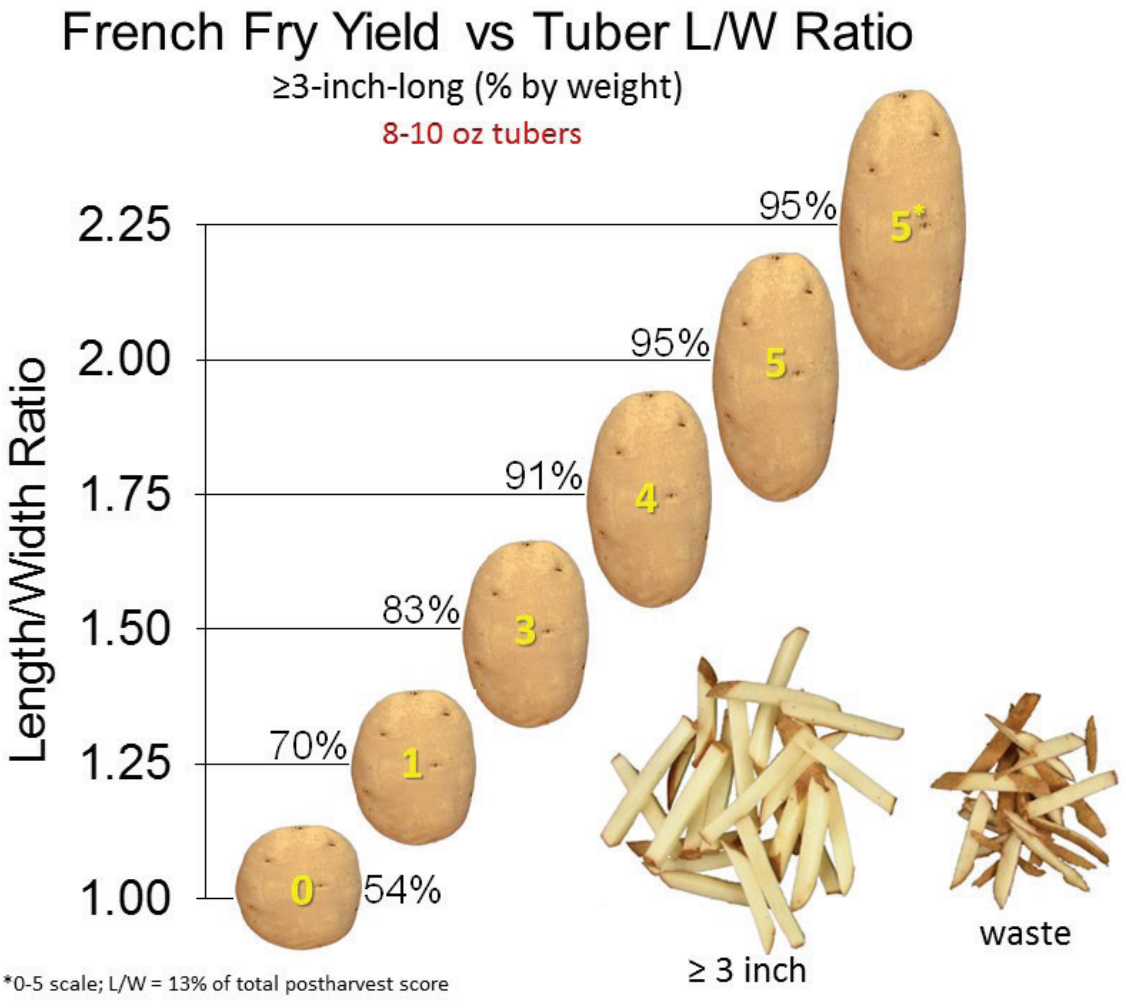


Reconditioning abilities of clones in the 2017 Regional Trial (3-state averages). Clones were stored at 40°F for 60 days after harvest and then reconditioned at 60°F for 21 days. Top: Stem end fry color before and after reconditioning. Numbers in bars indicate the USDA color rating of the stem end. Bottom: Percent improvement of stem and bud end fry color with reconditioning.

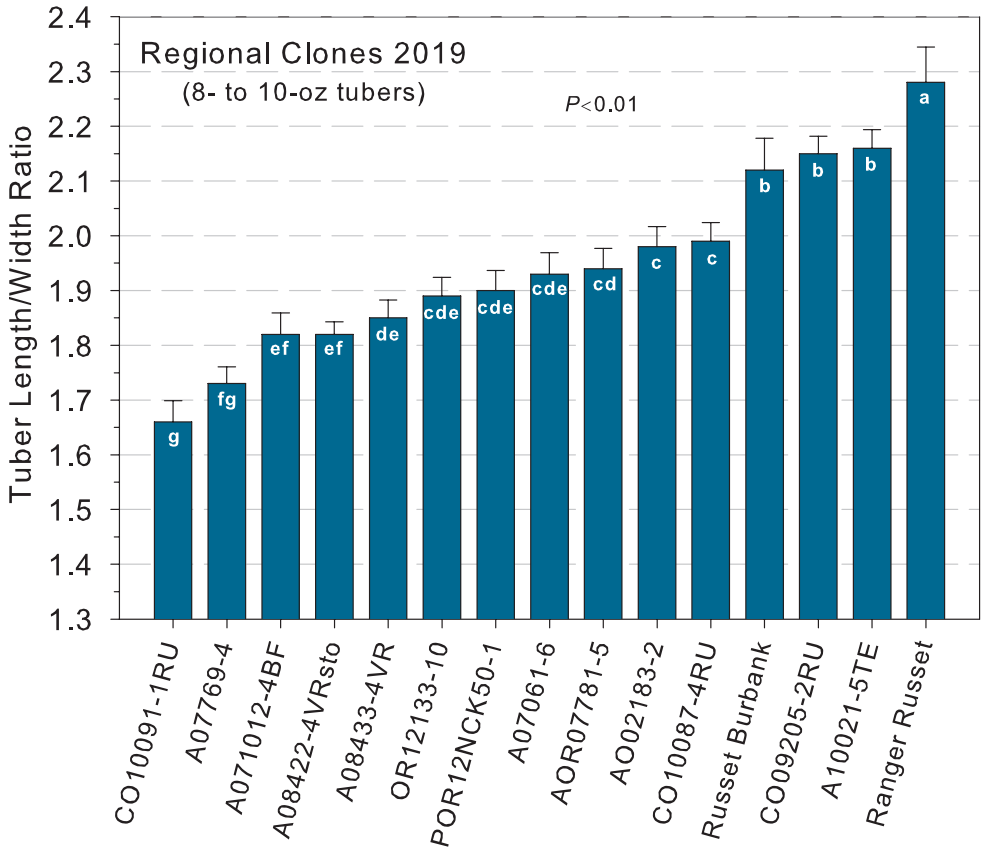
2019 Late Harvest Regional Trial

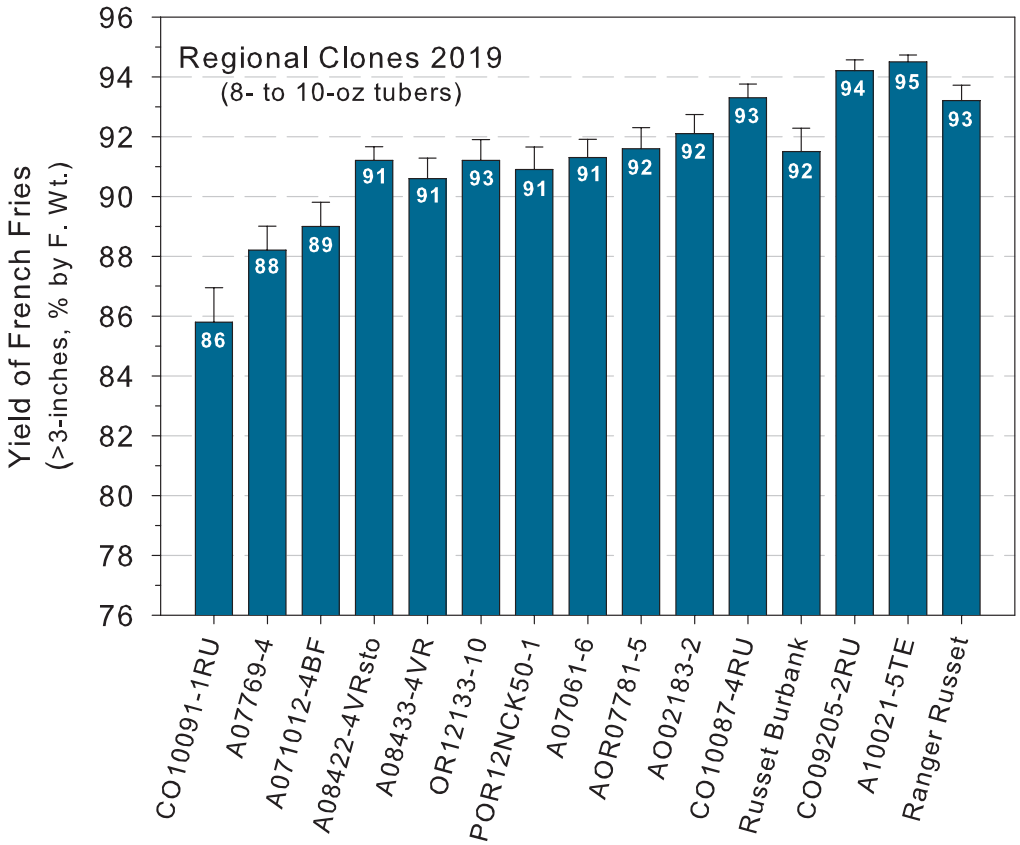
Length to Width Ratios of 8-10 oz Tubers

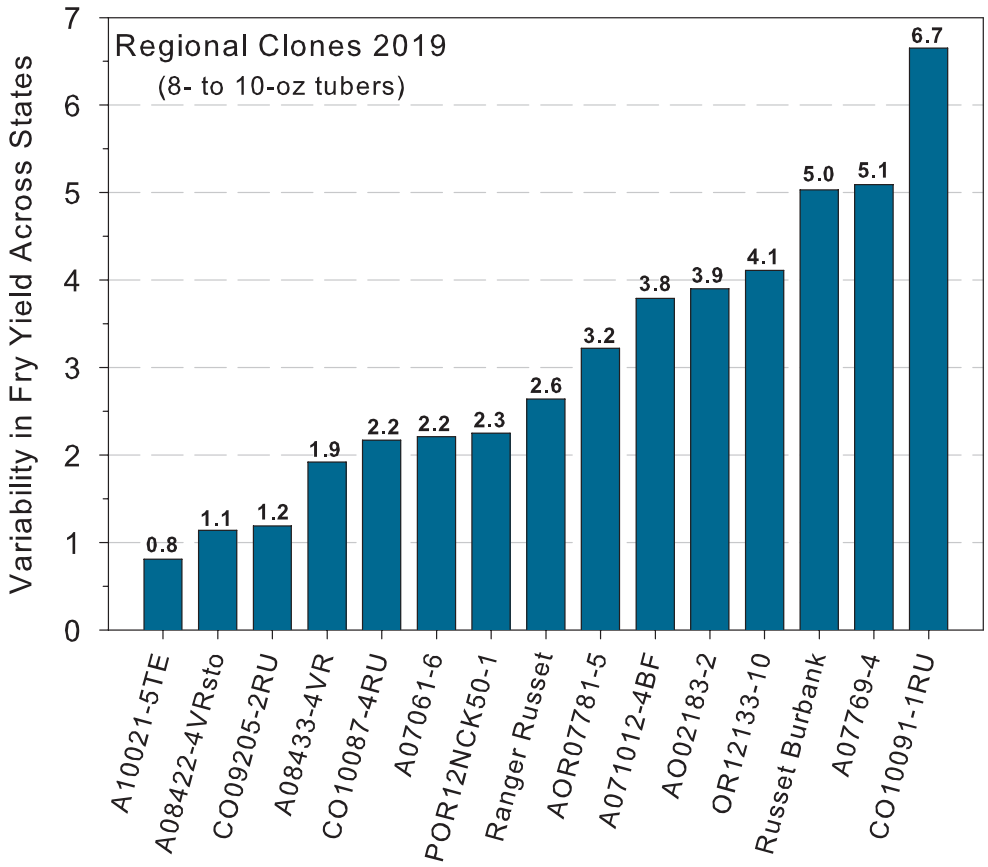
Clone	Length to width ratio WA	rtg §	ID	rtg §	OR	rtg §	3 State Avg.
1 Ranger Russet	1.80	**5**	2.84	**5**	2.19	**5**	2.28
2 Russet Burbank	1.58	**3**	2.41	**5**	2.37	**5**	2.12
3 A07061-6	1.77	**4**	2.21	**5**	1.80	**5**	1.93
4 A071012-4BF	1.58	**3**	2.09	**5**	1.78	**4**	1.82
5 A07769-4	1.47	**2**	1.83	**5**	1.90	**5**	1.73
6 A08422-4VRsto	1.73	**4**	1.84	**5**	1.89	**5**	1.82
7 A08433-4VR	1.72	**4**	1.84	**5**	1.99	**5**	1.85
8 A10021-5TE	1.95	**5**	2.35	**5**	2.19	**5**	2.16
9 AO02183-2	1.65	**4**	2.08	**5**	2.20	**5**	1.98
10 AOR07781-5	1.66	**4**	2.19	**5**	1.95	**5**	1.94
11 CO09205-2RU	1.96	**5**	2.18	**5**	2.31	**5**	2.15
12 CO10087-4RU	1.77	**4**	2.04	**5**	2.17	**5**	2.00
13 CO10091-1RU	1.43	**2**	No Sample		1.88	**5**	1.66
14 OR12133-10	1.61	**3**	2.11	**5**	1.95	**5**	1.89
15 POR12NCK50-1	1.68	**4**	2.15	**5**	1.86	**5**	1.90
Average	1.69		2.15		2.03		1.95



2019 Late Harvest Regional Trial







Relative ranking of clones in the Late Season Tri-State Trial for variability in yield of French fries prepared from 8- to 10-oz tubers. Variability is expressed as the standard deviation (calculated across ID, WA and OR production sites) for the yield of fries ≥3 inches in length (% by fresh weight) from 8- to 10-oz tubers. High values reflect more variation in tuber shape and thus fry yield from state to state. For example, CO10091-1Ru had a length to width ratio of 1.66, resulting in 86% of the tuber producing usable French fries ≥3 inches in length (page 86). However, tuber shape of this entry also varied the most across production sites (see above), resulting in fry yields ranging from 79 to 93% (89±6.7%).

Pages 85-86: Tuber length to width ratios and the associated percentage yield of fries. Bars with same letter are not significantly different (P≤0.01).

2019 Tri-State Specialty Trial

Location: WSU Research Center – Othello, WA
Planting Date: April 4 Vine Kill Date: July 22
Harvest Date: August 5 Days Grown: 109
In-Row Spacing: 8 Inch

The Tri-State Specialty trial is a part of the overall Tri-State Trial effort. This trial consists of clones with unique color and attributes which are primarily evaluated for fresh market suitability. This year's trial compared 2 local reference varieties to 7 new clones. The following is a summary of the Washington field and postharvest results.

Visual Standouts (nice color, skin, size distribution, & shape):
(See also: grading comments and US #1 yield ranking near front of book)

Reds: A08122-12R, NDA-8512C-1R
Yellows: None

Standcounts

- **50 Day**
  Full emergence: COA13142-2Y (95%), A08122-12R (93%), and ATX05175S-1R/Y (90%).

Plant and Tuber Growth & Development

- **50 Day Stems per plant**
  Most: COA13039-4Y (4.6).
  Fewest: NDA8512C-1R (1.9).

- **Average Tuber Number Per Plant**
  Most: A08122-12R (14.5) and COA1314-2Y (14.1).
  Fewest: Yukon Gold (4.7) and Chieftain (7.8).

- **Average Tuber Size (oz)**
  Largest: Yukon Gold (8.8), Chieftain (6.9), and NDA8512C-1R (6.3).
  Smallest: COA13142-2Y (2.7) and A08112-7R (3.7).

Yield Data

- **Total Yield and U.S. #1 Yield**
  Highest: A08122-12R had the highest total (831 CWT/A) and second highest U.S. #1 yield (791 CWT/A) COTX04193S-2R/Y had the second highest total yield (822 CWT/A) and the highest U.S. #1 yield (793 CWT/A).
  Lowest: A08112-7R had the lowest total (544 CWT/A) and U.S. #1 yield (527 CWT/A).

- **% U.S. #1's**
  Highest: COA13142-2Y (98%).

2019 Tri-State Specialty Trial

Summaries

ENTRY	TOTAL YIELD		US # 1's* > 0 oz	US # 2's* > 0 oz	Culls* > 0 oz	EXTERNAL DEFECTS 1 = Severe 5 =None		
	CWT/A	Tons/A	% of Total Yield			Growth Knobs	Cracks	Green
Red Skin/White Flesh								
Chieftain	770	38.5	95	1	4	0	3	0
A08122-12R	831	41.5	93	4	2	0	1	1
NDA8512C-1R	734	36.7	91	4	5	0	5	0
A08112-7R	544	27.2	96	3	1	1	0	1
Red-Purple/Yellow Flesh								
ATTX05175S-1R/Y	735	36.8	96	3	1	0	0	1
COTX04193S-2R/Y	822	41.1	96	1	3	0	1	1
Yellow Flesh								
Yukon Gold	591	29.6	93	5	2	0	0	0
COA13039-4Y	702	35.1	94	5	1	0	0	0
COA13142-2Y	546	27.3	98	2	1	0	0	0

ENTRY	US # 1 YIELD							Specific Gravity
	CWT/A	Tons/A	0-2 oz*	2-4 oz*	4-6 oz*	6-10 oz*	> 10 oz*	
			%----------					
Red Skin/White Flesh								
Chieftain	737	36.8	2	8	19	43	29	1.069
A08122-12R	791	39.6	9	31	30	26	4	1.068
NDA8512C-1R	679	33.9	2	11	23	45	19	1.070
A08112-7R	527	26.3	12	34	30	22	1	1.068
Red-Purple/Yellow Flesh								
ATTX05175S-1R/Y	712	35.6	10	34	33	22	2	1.072
COTX04193S-2R/Y	793	39.6	5	25	32	29	10	1.071
Yellow Flesh								
Yukon Gold	569	28.4	1	5	9	30	54	1.083
COA13039-4Y	678	33.9	7	28	27	33	6	1.079
COA13142-2Y	535	26.8	22	61	15	2	0	1.079

ENTRY	SKIN SET 1 = Poor 5 = Good	TUBER SHAPE 1 = Round 5 = Long	50 DAY STAND % Emerged	STEMS PER PLANT Above Ground	AVERAGE TUBER WEIGHT Ounces	AVERAGE TUBER NUMBER Tubers/Plant	SIZE UNIFORMITY 1 = Poor 5 = Good	SHAPE UNIFORMITY 1 = Poor 5 = Good
Red Skin/White Flesh								
Chieftain	3.3	1.0	77	2.4	6.9	7.8	3.0	3.0
A08122-12R	3.0	1.0	93	3.4	4.0	14.5	4.0	4.0
NDA8512C-1R	2.3	1.0	83	1.9	6.3	8.2	3.3	2.3
A08112-7R	3.3	1.0	87	3.3	3.7	10.3	3.7	3.0
Red-Purple/Yellow Flesh								
ATTX05175S-1R/Y	2.0	1.0	90	2.5	3.8	13.5	4.0	3.0
COTX04193S-2R/Y	3.3	1.0	88	3.1	4.7	12.1	4.0	4.0
Yellow Flesh								
Yukon Gold	4.0	1.0	85	2.6	8.8	4.7	3.0	3.3
COA13039-4Y	4.0	1.0	72	4.6	4.4	11.1	3.0	3.3
COA13142-2Y	4.5	1.0	95	3.4	2.7	14.1	4.0	4.0

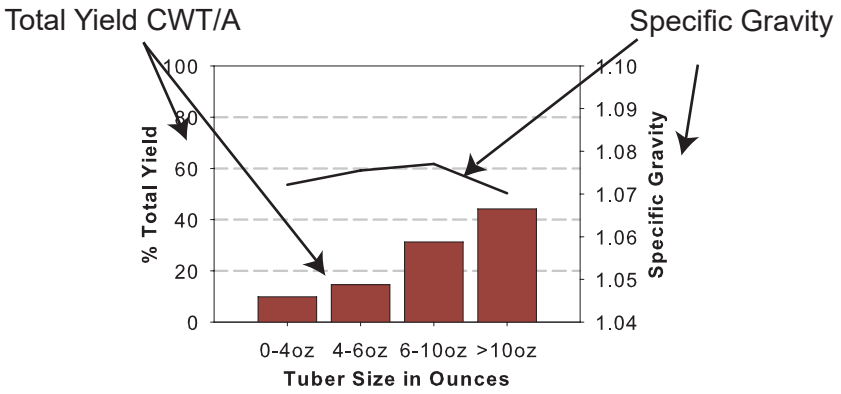
* Percent values may not total 100% due to rounding

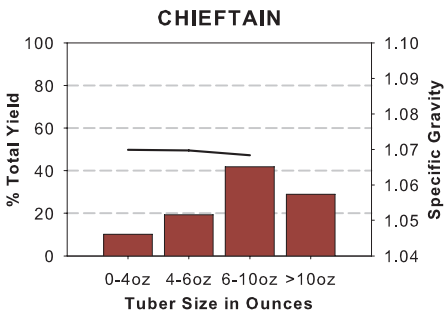
2019 Tri-State Specialty Trial

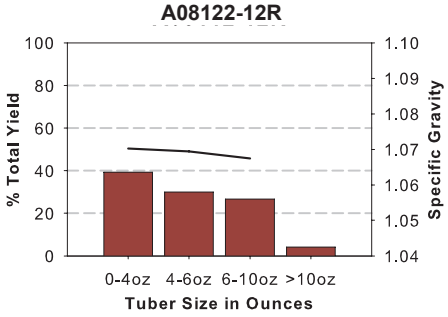
Tuber Yield and Specific Gravity Distributions

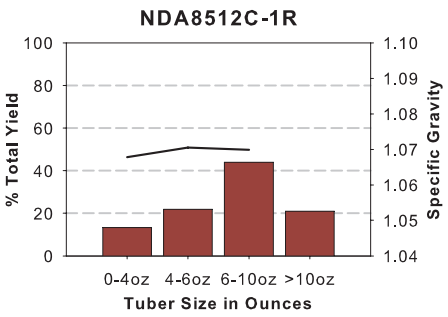
Note: Specific Gravity is based on a sample of U.S. #1 tubers within each size category

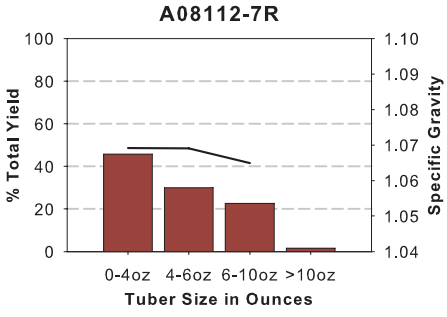
In-Row Spacing = 8 inches, Row Width = 32 inches

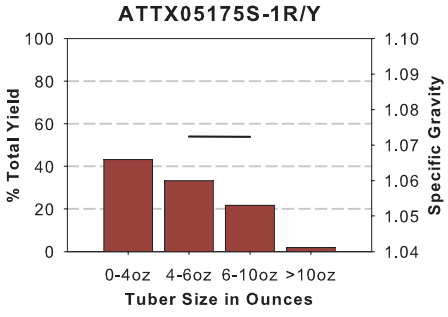


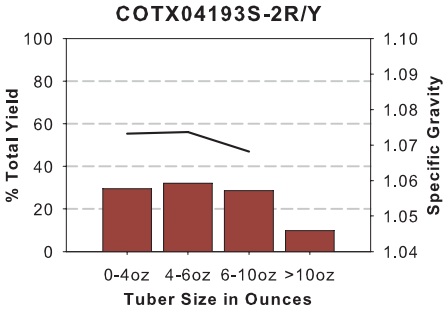


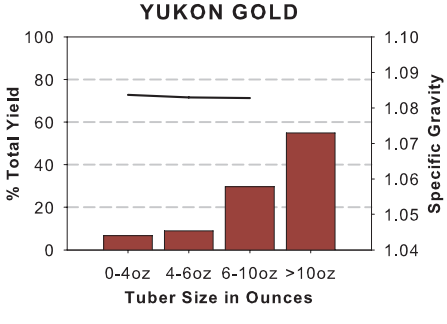


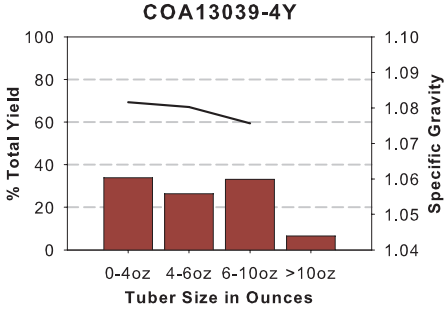


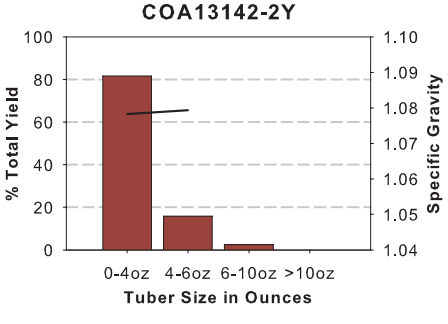












Postharvest Analysis

Entrees in the Tri-State Red and Specialty Trials are evaluated for their suitability as fresh market potatoes. The specialty entries include varieties and clones with various combinations of skin and flesh colors. The 2019 trial consisted of two cultivars and seven numbered clones. The trial was grown at Othello and harvested in late July. Cooking and culinary evaluations were completed August 15-23.

- There were six red skinned and three yellow fleshed clones in this year's trial. ATTX05175S-1R/Y and COTX04193S-2R/Y have red skin and yellow flesh. Yukon Gold, COA13039-4Y and COA13142-2Y have yellow skin.

Overall Culinary Evaluation Scores

	Clone	Boiled (25 max)	Baked (25 max)	Microwaved (25 max)	Total (75 max)
1	Chieftain	16.7	20.4	18.7	55.8
2	A08122-12R	17.1	19.4	18.0	54.5
6	COTX04193S-2R/Y	18.8	18.7	17.0	54.5
3	NDA8512C-1R	19.3	18.9	16.3	54.4
5	ATTX05175S-1R/Y	17.7	18.7	17.7	54.1
7	Yukon Gold	15.8	17.4	19.7	52.9
4	A08112-7R	16.2	18.4	17.9	52.5
9	COA13142-2Y	16.3	16.3	19.3	51.8
8	COA13039-4Y	18.2	16.4	15.1	49.7

Chipped:	Aug. 16
Boiled:	Aug. 22
Microwaved:	Aug. 21
Baked:	Aug. 23
Cooking Time:	Aug. 15

- As in previous years, culinary scores were high with all entries receiving 66 to 74% of the total points possible in the 2019 culinary evaluations.

- The top scoring clone was Chieftain with 55.8/75 points. A08122-12R and COTX04193S-2R/Y scored 54.5 points, NDA8512C-1R received 54.4 points, and ATTX05175S-1R/Y received 54.1 points. Last season ATTX05175S-1R/Y was the lowest scoring entry. Yukon Gold scored 52.9 points even though it is usually one of the highest scoring entries.

- COA13039-4Y was the lowest scoring entry this season with 49.7 points of the possible 75. This clone is prone to after cooking darkening. It rated 2.9/5 when microwaved and only slightly better (3/5) when boiled. COA13142-2Y also showed after cooking darkening when baked or microwaved.

- A08122-12R had no after cooking darkening when oven baked. Chieftain, NDA8512C-1R, A08112-7R and Yukon Gold had slight after cooking darkening, while ATTX05175S-1R/Y, COTX04193S-2R/Y, COA13039-4Y and COA13142-2Y were rated as moderate. The texture of all baked samples was rated favorably as "creamy" or "fluffy. Flavor of the baked samples was acceptably rated as "good" or "bland. Skins of Chieftain and A08122-12R were rated as "fully cooked" while all the other entries were rated as "steamy" after baking.

- Yukon Gold showed excessive sloughing when boiled. NDA8512C1R, ATTX05175S-1R/Y and COTX04193S-2R/Y had "slight" sloughing. All other entries showed slight to moderate sloughing when boiled. COA13039-4Y had moderate after cooking darkening; all other boiled entries had "slight" after cooking darkening. The texture of all samples were favorably rated as "fluffy" or "creamy". The tuber centers of all entries were rated as "mushy" or "fully cooked".

- Microwaving produced “moderate” after cooking darkening in NDA8512C-1R, ATTX05175S-1R/Y, COA13039-4Y and COA1314292Y. After cooking darkening in the remaining entries was rated as “slight”. Texture of microwaved samples was favorably rated as “fluffy” or “creamy” for all entries. The flavor ratings of microwaved samples ranged from “bland” to “good” for all entries. Tuber center ratings of all entries were rated “mushy” except for COA13039-4Y, which was “somewhat raw”. Skins were rated favorably as either “steamy” or “fully cooked” following microwaving.

- COA13142-2Y produced the darkest chips with a SFA color rating of 4.2. All other entries produced chips, ranging from 2.6 (A08122-12R) to 4.0 (Chieftain) on the SFA 1-5 scale, with the average being 3.3.

- Cooking time for boiled samples was assessed again this year. Cores of tuber tissue (1.3 cm diameter x 1.3 cm long) from the stem and bud ends of all entries were immersed in boiling water and the time to penetration by a 90-g probe was recorded. Stem end cores averaged 4.2 min to cook compared with 3.4 min for bud end cores. Cooking times (stem end) ranged from 3.7 min (A08122-12R & COTX04193S-2R/Y) to 5.0 min (NDA8512C-1R). Average cooking times ranged from 3.3 minutes for COTX04193S-2R/Y to 4.4 minutes for NDA8512C-1R. COTX04193S-2R/Y was also the fastest cooking in the boiling trials in 2018 (average time was 3.0 min).

2019 Washington Tri-State Specialty Trial

Red Clone Culinary Evaluation

Boiled

	Clone	Flavor	After Cooking Darkening	Texture	Tuber Center	Sloughing	Total Rating
1	Chieftain	3.2	4.1	2.9	4.1	2.4	16.7
2	A08122-12R	3.0	4.1	2.6	4.6	2.8	17.1
3	NDA8512C-1R	3.7	4.1	2.8	4.8	3.9	19.3
4	A08112-7R	2.4	4.1	3.1	3.8	2.8	16.2
5	ATTX05175S-1R/Y	2.9	3.7	3.1	4.3	3.7	17.7
6	COTX04193S-2R/Y	4.1	3.8	3.0	4.1	3.8	18.8
	LSD 0.05	*1.2*	*ns*	*ns*	*0.7*	*0.6*	*2.7*
	Average	3.2	4.0	2.9	4.3	3.2	17.6

Oven Baked

	Clone	Flavor	After cooking Darkening	Texture	Tuber Center	Skin Rating	Total Rating
1	Chieftain	3.3	4.4	3.4	4.7	4.6	20.4
2	A08122-12R	2.7	4.6	3.6	3.7	4.9	19.4
3	NDA8512C-1R	3.3	4.1	3.4	3.6	4.4	18.9
4	A08112-7R	2.7	4.3	3.1	4.3	4.0	18.4
5	ATTX05175S-1R/Y	3.4	3.4	3.4	4.3	4.1	18.7
6	COTX04193S-2R/Y	3.7	3.4	3.1	4.4	4.0	18.7
	LSD 0.05	*ns*	*0.7*	*ns*	*1.1*	*ns*	*ns*
	Average	3.2	4.0	3.4	4.2	4.3	19.1

Microwaved

	Clone	Flavor	After cooking Darkening	Texture	Tuber Center	Skin Rating	Total Rating
1	Chieftain	3.6	4.0	3.1	3.9	4.1	18.7
2	A08122-12R	2.6	3.9	3.6	4.1	3.9	18.0
3	NDA8512C-1R	3.1	2.9	2.9	3.1	4.3	16.3
4	A08112-7R	2.7	3.7	3.3	3.7	4.4	17.9
5	ATTX05175S-1R/Y	3.1	3.4	3.1	4.0	4.0	17.7
6	COTX04193S-2R/Y	3.6	3.7	2.7	2.6	4.4	17.0
	LSD 0.05	*ns*	*1.1*	*ns*	*1.4*	*ns*	*ns*
	Average	3.1	3.6	3.1	3.6	4.2	17.6

*Differences between clones equal to or greater than the LSD 0.05 are significant.

2019 Washington Tri-State Specialty Trial

Specialty Clone Culinary Evaluation

Boiled

Clone	Flavor	After Cooking Darkening	Texture	Tuber Center	Sloughing	Total Rating
7 Yukon Gold	2.5	4.1	3.6	4.2	1.4	15.8
8 COA13039-4Y	3.7	3.0	3.9	4.2	3.4	18.2
9 COA13142-2Y	3.3	3.8	2.8	4.2	2.2	16.3
LSD 0.05	1.8	*0.7*	*ns*	*ns*	*0.6*	*ns*
Average	3.2	3.6	3.4	4.2	2.3	16.7

Oven Baked

Clone	Flavor	After cooking Darkening	Texture	Tuber Center	Skin Rating	Total Rating
7 Yukon Gold	2.7	4.0	3.0	3.6	4.1	17.4
8 COA13039-4Y	3.0	3.1	3.4	3.3	3.6	16.4
9 COA13142-2Y	2.6	2.9	2.9	4.0	4.0	16.3
	ns	*0.8*	*ns*	*ns*	*ns*	*ns*
Average	*2.8*	*3.3*	*3.1*	*3.6*	*3.9*	*16.7*

Microwaved

Clone	Flavor	After cooking Darkening	Texture	Tuber Center	Skin Rating	Total Rating
7 Yukon Gold	3.3	4.4	4.1	3.4	4.4	19.7
8 COA13039-4Y	3.1	2.9	3.0	2.4	3.7	15.1
9 COA13142-2Y	3.7	2.9	3.7	4.4	4.6	19.3
	ns	*1.0*	*ns*	*1.5*	*ns*	*3.8*
Average	3.4	3.4	3.6	3.4	4.2	18.0

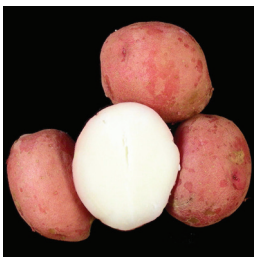
*Differences between clones equal to or greater than the LSD 0.05 are significant.

Chipping and Boiling Evaluations

	(Chips)	(BOILED Cooking Time)		
Clone	Av of 9 raters SFA	Time to Breakdown (min) Stem	Bud	Average
1 Chieftain	4.0	4.3	3.6	4.0
2 A08122-12R	2.6	3.7	3.6	3.7
3 NDA8512C-1R	3.4	5.0	3.7	4.4
4 A08112-7R	3.8	3.8	3.4	3.6
5 ATTX05175S-1R/Y	2.8	4.2	3.1	3.6
6 COTX04193S-2R/Y	3.0	3.7	2.9	3.3
7 Yukon Gold	3.8	4.9	3.6	4.2
8 COA13039-4Y	2.6	4.2	3.3	3.8
9 COA13142-2Y	4.2	4.3	3.2	3.8
*LSD 0.05 **		*0.9*	*0.3*	
Average	3.3	4.2	3.4	3.8

*Differences between clones equal to or greater than the LSD 0.05 are significant.
SFA 1 (lightest) to 5 (darkest).

Tubers	WA Tri-State Specialty Trial Comments
Chieftain	
	**Tubers:** Round tubers. Fair skin set; moderate eye depth. **Baked:** slight after cooking darkening, creamy texture, bland flavor, fully cooked tuber center, fully cooked skin. **Boiled:** severe sloughing, slight after cooking darkening, creamy texture, bland flavor, mushy tuber center. **Microwaved:** slight after cooking darkening, creamy texture, good flavor, mushy tuber center, steamy skin.
A08122-12R	
	**Tubers:** Round tubers. Fair skin set; moderate eye depth. **Baked:** none after cooking darkening, fluffy texture, bland flavor, mushy tuber center, fully cooked skin. **Boiled:** moderate sloughing, slight after cooking darkening, creamy texture, bland flavor, fully cooked tuber center. **Microwaved:** slight after cooking darkening, fluffy texture, bland flavor, mushy tuber center, steamy skin.
NDA8512C-1R	
	**Tubers:** Round tubers. Poor skin set; moderate eye depth. **Baked:** slight after cooking darkening, creamy texture, bland flavor, mushy tuber center, steamy skin. **Boiled:** slight sloughing, slight after cooking darkening, creamy texture, good flavor, fully cooked tuber center. **Microwaved:** moderate after cooking darkening, creamy texture, bland flavor, mushy tuber center, steamy skin.
A08112-7R	
	**Tubers:** Round tubers. Fair skin set; moderate eye depth. **Baked:** slight after cooking darkening, creamy texture, bland flavor, mushy tuber center, steamy skin. **Boiled:** moderate sloughing, slight after cooking darkening, creamy texture, unacceptable flavor, mushy tuber center. **Microwaved:** slight after cooking darkening, creamy texture, bland flavor, mushy tuber center, steamy skin.
ATTX05175S-1R/Y	
	**Tubers:** Round tubers. Poor skin set; moderately deep eyes. **Baked:** moderate after cooking darkening, creamy texture, bland flavor, mushy tuber center, steamy skin. **Boiled:** slight sloughing, slight after cooking darkening, creamy texture, bland flavor, mushy tuber center. **Microwaved:** moderate after cooking darkening, creamy texture, bland flavor, mushy tuber center, steamy skin.

Chips	Baked	Boiled	Microwaved
Chieftain			
			
A08122-12R			
			
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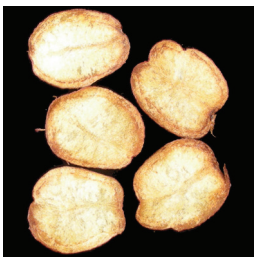
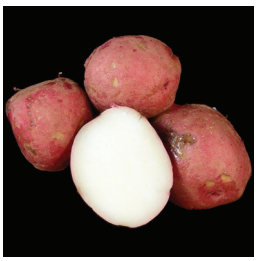
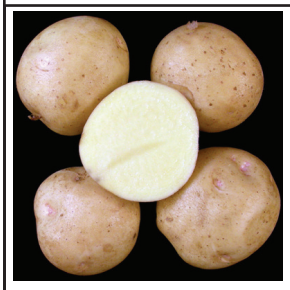
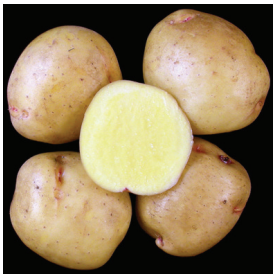
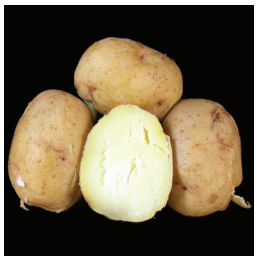
			
A08112-7R			
			
ATTX05175S-1R/Y			
			

Tubers	WA Tri-State Specialty Trial Comments
COTX04193S-2R/Y	
	**Tubers:** Round tubers. Fair skin set; moderate eye depth. **Baked:** moderate after cooking darkening, creamy texture, good flavor, mushy tuber center, steamy skin. **Boiled:** slight sloughing, slight after cooking darkening, creamy texture, good flavor, mushy tuber center. **Microwaved:** slight after cooking darkening, creamy texture, good flavor, mushy tuber center, steamy skin.
Yukon Gold	
	**Tubers:** Round tubers. Good skin set; moderate eye depth. **Baked:** slight after cooking darkening, creamy texture, bland flavor, mushy tuber center, steamy skin. **Boiled:** excessive sloughing, slight after cooking darkening, fluffy texture, bland flavor, mushy tuber center. **Microwaved:** slight after cooking darkening, fluffy texture, bland flavor, mushy tuber center, steamy skin.
COA13039-4Y	
	**Tubers:** Round tubers. Good skin set; moderate eye depth. **Baked:** moderate after cooking darkening, creamy texture, bland flavor, mushy tuber center, steamy skin. **Boiled:** moderate sloughing, moderate after cooking darkening, fluffy texture, good flavor, mushy tuber center. **Microwaved:** moderate after cooking darkening, creamy texture, bland flavor, somewhat raw tuber center, steamy skin.
COA13142-2Y	
	**Tubers:** Round tubers. Very good skin set; moderate eye depth. **Baked:** moderate after cooking darkening, creamy texture, bland flavor, mushy tuber center, steamy skin. **Boiled:** severe sloughing, slight after cooking darkening, creamy texture, bland flavor, mushy tuber center. **Microwaved:** moderate after cooking darkening, fluffy texture, good flavor, mushy tuber center, fully cooked skin.

Chips	Baked	Boiled	Microwaved
COTX04193S-2R/Y			
			
Yukon Gold			
			
COA13039-4Y			
			
COA13142-2Y			
			

Index of Clones and Cultivars