

# 2019

## Potato Variety Development In Tulelake, CA

Three variety trials were grown at the Intermountain Research and Extension Center during 2019.

Trials were categorized by their market type and included russet, specialty and chip.

Trial results are summarized in this report.



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## 2019 Annual Progress Report Potato Variety Development in Tulelake

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Prepared Report

Three potato variety trials were conducted at the Intermountain Research and Extension Center (IREC) in Tulelake, CA. Trials were categorized by market type and included a Russet trial with 21 entries, a Specialty trial with 15 entries, and a Chipping trial with 10 entries. Entries included selections from the Western Regional (WR) variety development program, Southwest Regional (SWR) variety development program, and varieties of local interest.

Weather data can be found at: <http://www.cimis.water.ca.gov> Station # 91.

## Late Russet Variety Trial

The Late Russet Variety Trial is a combination of eighteen entries from the Western Regional Variety Trial (WR) and three entries from the Southwest Regional Trial (SWR). Merit scoring and culls were evaluated considering fresh market standards, given most Russets grown in Tulelake, CA are sold for fresh market. Important characteristics for the local area include total yield, percent US No. 1 yield, fresh merit score, tuber shape uniformity, low internal and external defects, and resistance to early-dying. See Tables 1-4 for Russet results and Figure 1 for entry pictures and comments.

### Trial Information

<b>Location:</b>	Intermountain Research and Extension Center, Tulelake, CA
<b>Soil Type:</b>	Tulebasin mucky silty clay loam
<b>Planting Date:</b>	May 17 <sup>th</sup> 2019
<b>Vine Kill Date:</b>	September 10 <sup>th</sup> 2019
<b>Days to Vine Kill:</b>	116
<b>Harvest Date:</b>	September 27 <sup>th</sup> 2019
<b>Irrigation:</b>	Solid-set sprinklers; applied water + precipitation = 23.65 inches
<b>Plot Length:</b>	18.3 Feet
<b>In-Row Spacing:</b>	10 Inches
<b>Row Spacing:</b>	36 Inches
<b>Number of Reps:</b>	4
<b># of Fertilizer/Acre:</b>	210-0-150
<b>Seed Treatment:</b>	Maxim 4FS and Fir Bark Dust
<b>Weed Control:</b>	Prowl H2O and Eptam 7E (pre emergence) Matrix SG (early post emergence)
<b>Insecticides:</b>	Admire Pro (In-furrow)
<b>Fungicides:</b>	Quadris (In-furrow)
<b>Vine Kill Method:</b>	Rolling and Reglone at labeled rates

Table 1. Tuber Yield and Size of Russet Potato Entries.

	Trial	%1's	Tuber Yield (cwt/A) <sup>1</sup>																
			U.S. 1's		Total		U.S. No. 1's										Culls + 2's		
							>14oz	10-14oz	6-10oz	4-6oz	<4oz								
<b>Ranger Russet</b>	WR	74	bcd	304.6	bcd	409.8	bcdef	30.2	abc	71.3	ab	148.2	cdefgh	85.1	efghi	49.9	gh	25.0	bcd
<b>Russet Burbank</b>	WR	65	cdef	248.0	def	378.3	cdefg	4.7	def	29.6	cde	122.9	cdefghi	95.5	cdefg	81.4	cde	44.3	ab
<b>Russet Norkotah</b>	WR	72	bcd	240.1	defg	332.0	ghi	17.5	abcdef	63.4	abc	111.3	fghij	65.4	ghi	52.9	fgh	21.5	bcd
<b>A07061-6</b>	WR	75	bc	358.0	ab	478.8	ab	5.0	def	38.6	bcde	169.5	abc	149.9	a	101.1	abc	14.7	cd
<b>A071012-4BF</b>	WR	77	ab	349.9	ab	452.8	abc	25.4	abcde	81.4	a	162.9	abcde	105.5	cde	58.4	efgh	19.1	bcd
<b>A07769-4</b>	WR	78	ab	328.7	bc	419.5	bcde	34.9	a	88.8	a	172.5	abc	67.4	ghi	38.0	h	17.9	bcd
<b>A08422-4VRsto</b>	WR	85	a	345.9	ab	405.1	bcdefg	6.5	cdef	41.8	bcde	201.3	ab	102.8	cdef	48.8	gh	3.9	d
<b>A08433-4VR</b>	WR	79	ab	311.1	bcd	393.9	cdefg	7.3	cdef	38.5	bcde	156.4	bcdef	116.3	bcd	62.3	defgh	13.2	d
<b>A10021-5TE</b>	WR	65	def	251.1	def	385.5	cdefg	4.3	def	13.4	e	100.4	hij	137.3	ab	122.5	a	7.5	d
<b>AO02183-2</b>	WR	76	ab	333.7	bc	438.5	abc	37.6	a	82.7	a	165.4	abcd	85.5	efghi	49.3	gh	17.9	bcd
<b>AOR07781-5</b>	WR	66	cdef	220.9	efgh	338.5	fghi	20.3	abcdef	59.1	abcd	105.1	ghij	56.7	i	44.9	gh	52.5	a
<b>CO09076-3RU</b>	WR	55	g	186.3	fgh	341.1	fghi	32.9	ab	42.4	bcde	81.3	ij	62.6	hij	68.5	defg	53.4	a
<b>CO09205-2RU</b>	WR	76	ab	269.9	cde	355.4	defgh	5.5	def	41.9	bcde	133.6	cdefgh	94.4	cdefg	61.8	defgh	18.2	bcd
<b>CO10087-4RU</b>	WR	70	bcde	174.1	gh	246.9	j	2.5	ef	20.9	de	79.6	ij	73.6	fghi	60.9	defgh	9.5	d
<b>CO10091-1RU</b>	WR	59	fg	160.3	h	269.9	ij	0.0	f	8.0	e	70.1	j	82.3	efghi	106.9	ab	2.7	d
<b>COTX05095-2Ru/Y</b>	WR	62	efg	264.9	cde	424.6	bcd	7.3	cdef	25.9	cde	114.3	efghij	124.6	abc	111.5	a	40.9	abc
<b>OR12133-10</b>	WR	80	ab	406.3	a	510.3	a	10.0	bcdef	54.7	abcd	207.6	a	144.0	ab	85.3	bcd	8.6	d
<b>POR12NCK50-1</b>	WR	76	ab	308.7	bcd	405.5	bcdefg	26.4	abcd	71.8	ab	153.9	bcdefg	83.0	efghi	55.6	fgh	14.7	cd
<b>COTX08322-10RU</b>	SWR	72	bcd	252.4	def	348.6	efgh	1.1	f	37.4	bcde	128.3	cdefghi	86.7	defghi	74.8	def	20.3	bcd
<b>CO10085-1RU</b>	SWR	71	bcde	202.2	efgh	285.5	hij	3.1	def	34.3	bcde	100.2	hij	67.6	ghi	67.4	defg	12.8	d
<b>CO11009-3RU</b>	SWR	75	bc	247.5	def	331.1	ghi	5.4	def	41.6	bcde	117.2	defghij	88.7	defgh	60.6	efgh	17.6	bcd
<b>Mean</b>		<b>72</b>		<b>274.5</b>		<b>378.6</b>		<b>13.7</b>		<b>47</b>		<b>133.4</b>		<b>94.1</b>		<b>69.7</b>		<b>20.8</b>	

<sup>1</sup>Mean comparisons were performed using Tukey's-Kramer HSD; means with the same letter within columns are not significantly different

Table 2. External Tuber Characteristics of Russet Potato Entries.

	Trial	Merit Score <sup>1</sup>		Russetting <sup>2</sup>		Eye Depth <sup>3</sup>		Shape Uniformity <sup>4</sup>		Length/Depth Ratio <sup>5</sup>		Length/Width Ratio <sup>5</sup>	
<b>Ranger Russet</b>	WR	3.5	ab	3.0	de	3.9	abcd	4.0	ab	2.43	abcde	2.03	ab
<b>Russet Burbank</b>	WR	3.4	ab	3.3	bcd	3.8	abcd	3.8	ab	2.22	bcdef	1.86	bcdef
<b>Russet Norkotah</b>	WR	3.9	a	4.1	ab	3.8	abcd	3.8	ab	2.05	defg	1.79	defg
<b>A07061-6</b>	WR	2.3	c	2.0	f	3.9	abcd	3.5	b	1.97	bcdef	1.67	fghi
<b>A071012-4BF</b>	WR	3.4	ab	3.4	abcd	3.3	cd	4.0	ab	1.96	defg	1.70	fgh
<b>A07769-4</b>	WR	3.4	ab	3.3	bcd	3.3	cd	3.5	b	1.94	fg	1.72	efgh
<b>A08422-4VRsto</b>	WR	2.9	bc	2.9	def	3.9	abcd	3.6	ab	1.94	abc	1.64	ghi
<b>A08433-4VR</b>	WR	3.4	ab	3.4	abcd	3.8	abcd	3.6	ab	2.00	a	1.56	hi
<b>A10021-5TE</b>	WR	3.4	ab	3.1	cde	3.8	abcd	4.0	ab	1.96	cdefg	1.83	cdefg
<b>AO02183-2</b>	WR	3.4	ab	3.4	abcd	4.0	abcd	3.9	ab	2.12	g	2.15	a
<b>AOR07781-5</b>	WR	3.1	abc	4.3	a	3.3	cd	3.6	ab	2.38	bcdef	1.83	bcdefg
<b>CO09076-3RU</b>	WR	3.1	abc	3.5	abcd	3.6	abcd	3.5	b	2.15	efg	1.98	abcd
<b>CO09205-2RU</b>	WR	3.5	ab	3.4	abcd	4.1	abc	4.4	a	2.24	bcdef	2.12	a
<b>CO10087-4RU</b>	WR	3.8	ab	3.4	abcd	4.4	a	4.0	ab	2.49	ab	1.99	abcd
<b>CO10091-1RU</b>	WR	3.1	abc	4.0	abc	4.3	ab	3.9	ab	2.43	ab	1.49	i
<b>COTX05095-2Ru/Y</b>	WR	3.4	ab	3.0	de	4.5	a	4.0	ab	1.85	fg	1.67	fghi
<b>OR12133-10</b>	WR	3.1	abc	2.3	ef	3.1	d	4.0	ab	1.88	defg	1.77	efg
<b>POR12NCK50-1</b>	WR	3.8	ab	3.8	abcd	3.4	bcd	3.9	ab	2.04	bcdef	2.02	abc
<b>COTX08322-10RU</b>	SWR	3.0	abc	3.3	bcd	3.6	abcd	3.5	b	2.39	bcdef	1.66	fghi
<b>CO10085-1RU</b>	SWR	3.1	abc	3.6	abcd	3.6	abcd	3.5	b	2.29	abcd	1.90	bcde
<b>CO11009-3RU</b>	SWR	3.8	ab	3.8	abcd	3.6	abcd	3.8	ab	1.98	efg	1.75	efgh
<b>Mean</b>		<b>3.3</b>		<b>3.3</b>		<b>3.7</b>		<b>3.8</b>		<b>2.13</b>		<b>1.82</b>	

<sup>1</sup> 1=Worst, 5=Best - Fresh Market Russet Merit Score takes into account multiple factors including tuber shape, eye depth, russetting, and shape uniformity

<sup>2</sup> 1=Light,5=Heavy

<sup>3</sup> 1=Deep, 5=Shallow

<sup>4</sup> 1= Non Uniform, 5=Very Uniform

<sup>5</sup> Ratio of 10 tubers measured from each plot, 8-14 oz in size.

Table 3. Tuber Defects of Russet Potato Entries.

	Trial	Hollow Heart <sup>1</sup>	Stem-end Necrosis <sup>1</sup>	Vascular Discoloration <sup>1</sup>	Black Spot Bruise <sup>1</sup>	Knobs <sup>2</sup>	Growth Crack <sup>2</sup>	Irregular Shaped <sup>2</sup>	Greening <sup>2</sup>	
		%	%	%	%	%	%	%	%	
	<b>Ranger Russet</b>	WR	0 c	0 a	25 abcd	3 a	0.1 a	1.8 bc	2.1 ab	0.5 ab
	<b>Russet Burbank</b>	WR	3 c	8 a	13 cd	5 a	2.4 a	4.5 ab	0.6 ab	0.1 b
	<b>Russet Norkotah</b>	WR	0 c	3 a	10 cd	0 a	2.2 a	0.4 c	0.9 ab	0.1 b
	<b>A07061-6</b>	WR	0 c	0 a	20 bcd	0 a	1.7 a	0.6 c	0.4 b	2.0 a
	<b>A071012-4BF</b>	WR	0 c	0 a	30 abcd	13 a	1.3 a	0.7 c	0.7 ab	0.1 b
	<b>A07769-4</b>	WR	3 c	5 a	10 cd	8 a	0.5 a	0.8 c	0.6 ab	0.9 ab
	<b>A08422-4VRsto</b>	WR	3 c	0 a	13 cd	0 a	0.0 a	0.3 c	0.3 b	0.0 b
	<b>A08433-4VR</b>	WR	0 c	0 a	13 cd	0 a	1.7 a	0.5 c	0.7 ab	0.5 ab
	<b>A10021-5TE</b>	WR	0 c	0 a	18 bcd	8 a	1.0 a	0.3 c	0.3 b	0.2 ab
	<b>AO02183-2</b>	WR	0 c	0 a	33 abcd	0 a	1.1 a	0.9 c	0.9 ab	0.5 ab
	<b>AOR07781-5</b>	WR	3 c	0 a	58 a	3 a	2.7 a	4.4 ab	1.8 ab	0.9 ab
	<b>CO09076-3RU</b>	WR	5 bc	3 a	10 cd	3 a	3.0 a	6.1 a	2.2 ab	0.7 ab
	<b>CO09205-2RU</b>	WR	0 c	0 a	20 bcd	0 a	1.2 a	0.4 c	2.0 ab	1.3 ab
	<b>CO10087-4RU</b>	WR	40 a	8 a	48 ab	0 a	0.7 a	1.1 c	0.7 ab	0.0 b
	<b>CO10091-1RU</b>	WR	8 bc	5 a	0 d	0 a	0.1 a	0.3 c	0.5 b	0.0 b
	<b>COTX05095-2Ru/Y</b>	WR	0 c	0 a	15 bcd	0 a	1.2 a	6.4 a	0.6 ab	0.5 ab
	<b>OR12133-10</b>	WR	0 c	0 a	38 abc	10 a	0.6 a	0.6 c	0.2 b	0.8 ab
	<b>POR12NCK50-1</b>	WR	0 c	3 a	48 ab	3 a	1.2 a	0.0 c	1.6 ab	0.1 b
	<b>COTX08322-10RU</b>	SWR	0 c	10 a	38 abc	3 a	1.3 a	0.0 c	2.7 a	0.5 ab
	<b>CO10085-1RU</b>	SWR	0 c	5 a	28 abcd	0 a	0.6 a	0.7 c	2.0 ab	0.0 b
	<b>CO11009-3RU</b>	SWR	18 b	0 a	8 cd	3 a	0.8 a	1.1 c	1.0 ab	0.5 ab
	<b>Mean</b>		<b>4</b>	<b>2</b>	<b>23</b>	<b>3</b>	<b>1.2</b>	<b>1.5</b>	<b>1.1</b>	<b>0.5</b>

<sup>1</sup> Ten, 8 to 14 oz. tubers were evaluated from each plot.

<sup>2</sup> Percent of total tubers.

Table 4. Disease Susceptibility, Stand, Tuber Set, Average Tuber Size and Specific Gravity of Russet Potato Entries.










Trial	Vert Wilt Rating <sup>1</sup>	Early Dying <sup>2</sup> (A.U.D.P.C.)	% Stand	Tubers per Plant	Average Tuber Size	Specific Gravity	
Ranger Russet	WR	5.3 defgh	229.5 fgh	99 a	6.6 defgh	6.2 abcd	1.092 cdef
Russet Burbank	WR	7.0 abcde	583.9 defg	99 a	7.4 def	5.2 efgh	1.088 defg
Russet Norkotah	WR	9.0 a	1951.3 a	98 a	5.8 gh	5.9 abcdef	1.078 h
A07061-6	WR	5.0 efgh	167.3 gh	100 a	9.9 a	4.9 fghi	1.084 fgh
A071012-4BF	WR	5.3 defgh	232.2 fgh	100 a	7.7 cde	5.9 abcde	1.088 defg
A07769-4	WR	6.3 cdefg	387.1 fgh	99 a	6.3 efgh	6.8 a	1.108 a
A08422-4VRsto	WR	7.5 abc	941.9 cde	98 a	7.2 defg	5.7 bcdef	1.096 bcd
A08433-4VR	WR	4.5 gh	117.6 gh	98 a	7.9 bcd	5.1 efgh	1.091 cdefg
A10021-5TE	WR	6.8 bcdef	525.9 efgh	98 a	9.0 abc	4.4 hi	1.096 bcde
AO02183-2	WR	3.8 h	92.1 h	100 a	6.8 defgh	6.4 ab	1.097 bcd
AOR07781-5	WR	7.0 abcde	485.3 efgh	99 a	5.4 h	6.4 abc	1.105 ab
CO09076-3RU	WR	7.8 abc	1032.6 bcd	95 abc	6.6 defgh	5.4 bcdefg	1.100 abc
CO09205-2RU	WR	6.5 cdefg	405.9 fgh	99 a	6.8 defgh	5.3 defgh	1.088 defg
CO10087-4RU	WR	9.0 a	1482.6 ab	89 c	6.1 fgh	4.6 ghi	1.082 gh
CO10091-1RU	WR	7.3 abcd	713.5 cdef	96 ab	7.1 defg	4.0 i	1.096 bcde
COTX05095-2Ru/Y	WR	8.8 ab	1682.5 a	98 a	9.3 ab	4.7 ghi	1.092 cdef
OR12133-10	WR	6.0 cdefg	399.4 fgh	100 a	9.4 ab	5.5 bcdefg	1.087 efgh
POR12NCK50-1	WR	6.5 cdefg	592.8 defg	95 abc	7.2 defg	5.9 abcde	1.099 bc
COTX08322-10RU	SWR	7.8 abc	1153.8 bc	99 a	7.0 defg	5.1 efgh	1.097 bcd
CO10085-1RU	SWR	4.8 fgh	178.8 gh	98 a	5.9 fgh	5.0 efgh	1.099 bc
CO11009-3RU	SWR	3.5 h	48.2 h	90 bc	6.9 defgh	5.4 cdefgh	1.102 ab
<b>Mean</b>		<b>6.4</b>	<b>638.3</b>	<b>97</b>	<b>7.3</b>	<b>5.4</b>	<b>1.093</b>










<sup>1</sup>Verticillium wilt ratings based on a 0-9 scale (0=None 9=Dead) for August 29<sup>th</sup> 104 days after planting.




<sup>2</sup>Area Under Disease Progress Curve based on foliar early-dying ratings taken 80, 91, 96 and 104 days after planting. Higher value is more susceptible



Figure 1. 2019 Late Russet Trial Entries.

Ranger Russet	Russet Burbank	Russet Norkotah
 <ul style="list-style-type: none"> <li>• Check</li> </ul>	 <ul style="list-style-type: none"> <li>• Check</li> </ul>	 <ul style="list-style-type: none"> <li>• Check</li> </ul>
COTX08322-10RU	A07061-6	A071012-4BF
 <ul style="list-style-type: none"> <li>• Susceptible to early dying</li> <li>• Irregular shape</li> </ul>	 <ul style="list-style-type: none"> <li>• High tubers per plant</li> <li>• Little russeting</li> <li>• Resistant to early dying</li> </ul>	 <ul style="list-style-type: none"> <li>• Blocky</li> <li>• Pink Eyes</li> </ul>
A07769-4	A08422-4VRsto	A08433-4VR
 <ul style="list-style-type: none"> <li>• High incidence of shatter bruise</li> </ul>	 <ul style="list-style-type: none"> <li>• High %1s</li> </ul>	 <ul style="list-style-type: none"> <li>• Lumpy</li> <li>• Resistant to early dying</li> </ul>

A10021-5TE	AO02183-2	AOR07781-5
 <ul style="list-style-type: none"> <li>• More &lt;4oz tuber size than most</li> </ul>	 <ul style="list-style-type: none"> <li>• Resistant to early dying</li> </ul>	 <ul style="list-style-type: none"> <li>• Lumpy shape</li> </ul>
CO09076-3RU	CO09205-2RU	CO10087-4RU
 <ul style="list-style-type: none"> <li>• Low % 1s</li> <li>• High % cull</li> </ul>	 <ul style="list-style-type: none"> <li>• Long and narrow</li> </ul>	 <ul style="list-style-type: none"> <li>• Lowest total yield in trial</li> </ul>
CO10091-1RU	COTX05095-2Ru/Y	OR12133-10
 <ul style="list-style-type: none"> <li>• Round</li> <li>• Small average tuber size</li> </ul>	 <ul style="list-style-type: none"> <li>• Blocky shape</li> <li>• Resistant to early dying</li> </ul>	 <ul style="list-style-type: none"> <li>• Very light russet</li> </ul>

POR13NCK50-1	CO10085-1RU	CO11009-3RU
 <ul style="list-style-type: none"><li>• Long</li><li>• Looks similar to Norkotah</li></ul>	 <ul style="list-style-type: none"><li>• More ruptured lenticels than most</li><li>• Resistant to early dying</li></ul>	 <ul style="list-style-type: none"><li>• Resistant to early dying</li></ul>

## Red/Specialty Variety Trial

The Red/Specialty Trial included 13 entries from the Western Regional Variety Trial (WR) and two entries from the Southwest Regional Trial (SWR). Important vine and tuber characteristics for fresh market red/specialty types include: skin and flesh color, fresh merit score, tuber shape, tuber uniformity, tubers per plant, and average tuber size. See Tables 5-9 for Red/Specialty trial results and Figure 2 for entry pictures and comments.

### Trial Information

<b>Location:</b>	Intermountain Research and Extension Center, Tulelake, CA
<b>Soil Type:</b>	Tulebasin mucky silty clay loam
<b>Planting Date:</b>	May 17 <sup>th</sup> 2019
<b>Vine Kill Date:</b>	September 10 <sup>th</sup> 2019
<b>Days to Vine Kill:</b>	116
<b>Harvest Date:</b>	October 1 <sup>st</sup> 2019
<b>Irrigation:</b>	Solid-set sprinklers; applied water + precipitation = 23.65 inches
<b>Plot Length:</b>	18.3 Feet
<b>In-Row Spacing:</b>	10 Inches
<b>Row Spacing:</b>	36 Inches
<b>Number of Reps:</b>	4
<b># of Fertilizer/Acre:</b>	210-0-150
<b>Seed Treatment:</b>	Maxim 4FS and Fir Bark Dust
<b>Weed Control:</b>	Prowl H2O and Eptam 7E (pre emergence) Matrix SG (early post emergence)
<b>Insecticides:</b>	Admire Pro (In-furrow)
<b>Fungicides:</b>	Quadris (In-furrow)
<b>Vine Kill Method:</b>	Rolling and Reglone at labeled rates

Table 5. Skin and Flesh Characteristics of Specialty Potato Entries.

Clone / Variety	Trial	Skin Color <sup>1</sup>	Skin Color Rating	Flesh color	Flesh Color Rating
Chieftain	WR	Red	2.1	White	1.8
Red LaSoda	WR	Red	2.0	White	1.9
A08112-7R	WR	Red	2.9	White	1.8
ATTX05175S-1R/Y	WR	Red	2.9	Yellow	3.1
ATX06264s-4R/Y	WR	Red	3.6	Yellow	3.3
COTX04193S-2R/Y	WR	Red	3.9	Yellow	3.5
Yukon Gold	WR	Yellow	1.1	Yellow	2.9
CO09128-5W/Y	WR	Yellow	1.0	Yellow	4.3
CO09218-4W/Y	WR	Yellow	1.0	Yellow	3.9
CO10064-1W/Y	WR	Yellow	1.0	Yellow	3.8
CO10097-2W/Y	WR	Yellow	1.1	Yellow	3.9
CO10098-5W/Y	WR	Yellow	1.6	Yellow	5.0
POR14PG22-3	WR	Yellow	1.0	Yellow	3.4
CO11250-1W/Y	SWR	Yellow	1.4	Yellow	3.1
CO11266-1W/Y	SWR	Yellow	1.5	Yellow	4.0
<b>Mean</b>			<b>1.9</b>		<b>3.3</b>

<sup>1</sup>1=Light, 5=Dark; Reds and purples were rated using red/purple color scale. Yellows were rated using a white/yellow color scale. All varieties were rated using the same internal flesh darkness scale.

Table 6. Tuber Yield and Size of Specialty Potato Entries.

Clone / Variety	Trial	Tuber Yield (cwt/A) <sup>1</sup>									
		Total Yield	10-14 oz	6-10 oz	4-6 oz	< 4oz	> 14 oz	Culls			
Chieftain	WR	617.8 a*	89.4 b	260.7 a	131.7 ab	102.5 gh	20.8 c	12.9 bc			
Red LaSoda	WR	626.5 a	129.4 a	163.4 b	56.3 d	48.6 i	122.0 a	106.7 a			
A08112-7R	WR	437.7 cd	5.8 cde	68.4 def	115.4 abc	231.9 c	0.8 c	15.3 bc			
ATTX05175S-1R/Y	WR	488.8 bc	3.4 de	46.8 ef	121.1 ab	298.7 bc	0.0 c	18.9 bc			
ATX06264s-4R/Y	WR	506.9 bc	29.8 c	131.2 bc	134.0 ab	191.9 cd	3.6 c	16.4 bc			
COTX04193S-2R/Y	WR	434.5 cd	4.5 cde	62.3 def	132.8 ab	227.5 c	0.0 c	7.5 bc			
Yukon Gold	WR	441.3 cd	84.0 b	144.7 bc	68.8 d	53.2 i	67.5 b	23.0 bc			
CO09128-5W/Y	WR	383.8 de	0.0 e	10.6 f	56.4 d	313.8 bc	0.0 c	3.0 c			
CO09218-4W/Y	WR	288.8 f	16.7 cde	83.9 cde	74.1 d	90.7 hi	6.1 c	17.3 bc			
CO10064-1W/Y	WR	431.0 cd	25.6 cde	123.8 bcd	119.5 ab	130.0 fgh	6.0 c	26.1 b			
CO10097-2W/Y	WR	431.0 cd	16.2 cde	135.5 bc	131.5 ab	139.8 efg	1.8 c	6.1 bc			
CO10098-5W/Y	WR	314.5 ef	3.1 de	64.8 def	84.7 cd	139.8 efg	1.1 c	21.0 bc			
POR14PG22-3	WR	559.8 ab	2.5 de	36.0 ef	110.5 bc	405.2 a	0.0 c	5.6 bc			
CO11250-1W/Y	SWR	505.9 bc	27.9 cd	138.2 bc	142.9 ab	179.7 de	2.6 c	14.7 bc			
CO11266-1W/Y	SWR	464.4 cd	14.4 cde	117.7 bcd	144.6 a	168.6 def	3.7 c	15.4 bc			
<b>Mean</b>		<b>462.2</b>	<b>30.2</b>	<b>105.9</b>	<b>104.4</b>	<b>181.5</b>	<b>15.7</b>	<b>20.7</b>			

<sup>1</sup>Mean comparisons were performed using Tukey's-Kramer HSD; means with the same letter within columns are not significantly different

Table 7. External Tuber Characteristics of Specialty Potato Entries.

Clone / Variety	Trial	Merit <sup>1</sup>	Eye Depth <sup>2</sup>	Tuber Shape <sup>3</sup>	Shape Uniformity <sup>4</sup>	Length/Depth Ratio <sup>5</sup>	Length/Width Ratio <sup>5</sup>
Chieftain	WR	3.5 a	3.6 a	2.6 ab	3.5 a	1.59 bc	1.27 bcd
Red LaSoda	WR	2.6 bcde	2.6 b	2.0 bcde	3.0 a	1.40 def	1.11 fgh
A08112-7R	WR	3.6 a	4.0 a	1.8 cdef	3.4 a	1.41 def	1.17 def
ATTX05175S-1R/Y	WR	3.6 a	3.9 a	1.5 def	3.4 a	1.29 efg	0.97 i
ATX06264s-4R/Y	WR	3.1 abc	3.9 a	1.6 def	3.4 a	1.44 cde	1.11 fgh
COTX04193S-2R/Y	WR	3.6 a	3.9 a	1.4 ef	3.5 a	1.41 def	1.03 hi
Yukon Gold	WR	3.4 ab	4.0 a	2.6 ab	3.5 a	1.55 cd	1.26 cde
CO09128-5W/Y	WR	3.6 a	4.1 a	1.1 f	3.8 a	1.23 g	1.05 ghi
CO09218-4W/Y	WR	3.1 abc	4.1 a	2.3 abcd	3.6 a	1.57 c	1.19 def
CO10064-1W/Y	WR	3.4 ab	3.9 a	2.3 abcd	3.8 a	1.49 cd	1.15 efg
CO10097-2W/Y	WR	2.9 abcd	4.0 a	1.6 def	4.0 a	1.26 fg	1.13 fgh
CO10098-5W/Y	WR	2.4 cde	3.8 a	3.0 a	3.3 a	1.81 a	1.43 a
POR14PG22-3	WR	2.5 cde	3.6 a	2.5 abc	2.9 a	1.47 cd	1.22 cdef
CO11250-1W/Y	SWR	2.3 de	3.9 a	2.9 a	2.9 a	1.74 ab	1.38 ab
CO11266-1W/Y	SWR	2.0 e	3.8 a	2.8 ab	3.1 a	1.54 cd	1.33 abc
<b>Mean</b>		<b>3.0</b>	<b>3.8</b>	<b>2.1</b>	<b>3.4</b>	<b>1.48</b>	<b>1.19</b>

<sup>1</sup> 1=Worst, 5=Best - Specialty Merit Score takes into account important appearance factors of the Specialty market including tuber shape, eye depth, and shape uniformity

<sup>2</sup> 1=Deep, 5=Shallow

<sup>3</sup> 1=Round, 5=Oblong

<sup>4</sup> 1= Poor uniformity, 5=Very Uniform

<sup>5</sup> Ratio of 10 tubers measured from each plot

Table 8. Tuber Defects of Specialty Potato Entries.

Clone / Variety	Trial	Hollow Heart <sup>1</sup>	Stem End Necrosis	Vascular Dicoloration <sup>1</sup>	Knobs <sup>2</sup>	Growth Crack <sup>2</sup>	Greening <sup>2</sup>
		%	%	%	%	%	%
<b>Chieftain</b>	WR	5 ab	3 a	23 ab	0.9 b	0.4 b	0.0 c
<b>Red LaSoda</b>	WR	0 b	0 a	13 ab	1.2 b	4.2 a	0.6 bc
<b>A08112-7R</b>	WR	0 b	3 a	20 ab	1.3 ab	0.0 b	1.5 bc
<b>ATTX05175S-1R/Y</b>	WR	0 b	0 a	25 ab	1.3 ab	0.1 b	1.3 bc
<b>ATX06264s-4R/Y</b>	WR	0 b	0 a	15 ab	1.4 ab	0.2 b	0.5 bc
<b>COTX04193S-2R/Y</b>	WR	5 ab	0 a	48 a	0.5 b	0.3 b	0.5 bc
<b>Yukon Gold</b>	WR	13 ab	8 a	15 ab	1.2 ab	0.3 b	0.2 c
<b>CO09128-5W/Y</b>	WR	0 b	0 a	20 ab	0.4 b	0.0 b	0.4 bc
<b>CO09218-4W/Y</b>	WR	20 a	5 a	10 b	1.1 b	0.1 b	1.8 ab
<b>CO10064-1W/Y</b>	WR	0 b	3 a	8 b	0.2 b	0.1 b	3.2 a
<b>CO10097-2W/Y</b>	WR	0 b	5 a	18 ab	0.7 b	0.0 b	0.1 c
<b>CO10098-5W/Y</b>	WR	0 b	0 a	33 ab	2.4 a	0.0 b	0.9 bc
<b>POR14PG22-3</b>	WR	0 b	0 a	23 ab	0.5 b	0.0 b	0.9 bc
<b>CO11250-1W/Y</b>	SWR	0 b	0 a	15 ab	1.0 b	0.2 b	0.7 bc
<b>CO11266-1W/Y</b>	SWR	3 b	0 a	25 ab	0.9 b	0.0 b	1.1 bc
<b>Mean</b>		<b>3</b>	<b>2</b>	<b>21</b>	<b>1.0</b>	<b>0.4</b>	<b>0.9</b>

<sup>1</sup> Ten, 6-10oz. tubers were evaluated from each plot.

<sup>2</sup> Percent of total tubers.












**Table 9. Disease Susceptibility, Stand, Tuber Set, Average Tuber Size and Specific Gravity of Specialty Potato Entries.**







Clone / Variety	Trial	Vert Wilt Rating <sup>1</sup>		Early-Dying <sup>2</sup> (A.U.D.P.C.)		% Stand		Tubers/Plant		Average Size (oz)		Specific Gravity	
<b>Chieftain</b>	WR	6.8	bc	528.1	cde	90	ab	11.3	de	5.6	c	1.081	gh
<b>Red LaSoda</b>	WR	6.0	bcd	439.2	cdef	97	a	7.6	f	7.9	a	1.087	defg
<b>A08112-7R</b>	WR	5.8	cd	271.5	efg	96	a	13.7	cd	3.1	ghi	1.091	cde
<b>ATTX05175S-1R/Y</b>	WR	6.5	bc	353.8	defg	99	a	17.0	b	2.7	hij	1.093	bcd
<b>ATX06264s-4R/Y</b>	WR	6.5	bc	402.3	defg	96	a	13.4	cd	3.6	defg	1.084	fg
<b>COTX04193S-2R/Y</b>	WR	8.8	a	1460.6	a	91	ab	13.8	cd	3.2	fgh	1.076	h
<b>Yukon Gold</b>	WR	7.0	abc	678.1	cd	91	a	7.0	f	6.4	b	1.087	defg
<b>CO09128-5W/Y</b>	WR	8.8	a	1177.5	ab	97	a	16.4	bc	2.2	j	1.085	efg
<b>CO09218-4W/Y</b>	WR	3.5	e	48.3	g	61	c	11.4	de	4.0	de	1.067	i
<b>CO10064-1W/Y</b>	WR	4.5	de	102.2	fg	88	ab	11.0	de	4.1	d	1.099	ab
<b>CO10097-2W/Y</b>	WR	6.0	bcd	272.7	efg	93	a	10.1	ef	4.2	d	1.085	efg
<b>CO10098-5W/Y</b>	WR	7.8	ab	826.9	bc	75	bc	11.5	de	3.4	efg	1.106	a
<b>POR14PG22-3</b>	WR	6.0	bcd	275.6	efg	98	a	21.7	a	2.4	ij	1.089	def
<b>CO11250-1W/Y</b>	SWR	5.3	cde	199.2	efg	97	a	12.2	de	3.9	de	1.097	bc
<b>CO11266-1W/Y</b>	SWR	4.5	de	81.1	fg	90	ab	12.3	de	3.8	def	1.091	cdef
<b>Mean</b>		<b>6.2</b>		<b>474.5</b>		<b>91</b>		<b>12.7</b>		<b>4.0</b>		<b>1.088</b>	

<sup>1</sup>Verticillium wilt ratings based on a 0-9 scale (0=None 9=Dead) for August 29<sup>th</sup> 104 days after planting.

<sup>2</sup>Area Under Disease Progress Curve based on foliar early-dying ratings taken 80, 91, 96 and 104 days after planting. Higher value is more susceptible.

**Figure 2. 2019 Red/Specialty Entries.**

Cheiftain	Red LaSoda	A08112-7R
 <ul style="list-style-type: none"> <li>• Check</li> </ul>	 <ul style="list-style-type: none"> <li>• Check</li> </ul>	 <ul style="list-style-type: none"> <li>• Uniform shape</li> </ul>
ATTX05175S-1R/Y	ATTX06264s-4R/Y	COTX04193S-2R/Y
 <ul style="list-style-type: none"> <li>• Pancake shaped</li> <li>• Low average tuber size</li> </ul>	 <ul style="list-style-type: none"> <li>• High percentage of &lt;4oz</li> <li>• Deep red to purple skin color</li> </ul>	 <ul style="list-style-type: none"> <li>• Flattened shape</li> <li>• Susceptible to black dot</li> </ul>
Yukon Gold	CO09128-5W/Y	CO09218-4W/Y
 <ul style="list-style-type: none"> <li>• Check</li> </ul>	 <ul style="list-style-type: none"> <li>• Pink eyes</li> </ul>	 <ul style="list-style-type: none"> <li>• Flat shape</li> <li>• Ruptured lenticels</li> <li>• 20% hollow heart</li> <li>• 60% stand</li> </ul>

CO10064-1W/Y	CO10097-2W/Y	CO10098-5W/Y
 <ul style="list-style-type: none"><li>• Pink eyes</li></ul>	 <ul style="list-style-type: none"><li>• Has some russeting</li></ul>	 <ul style="list-style-type: none"><li>• Susceptible to black dot</li></ul>
POR14PG22-3	CO11250-1W/Y	CO11266-1W/Y
 <ul style="list-style-type: none"><li>• High tubers per plant</li><li>• High &lt;4oz tuber yield</li></ul>	 <ul style="list-style-type: none"><li>• Pink eyes and pink splotches on skin</li></ul>	 <ul style="list-style-type: none"><li>• Pink eyes and pink splotches on skin</li></ul>

## Chipping Potato Variety Trial

The 2019 Chipping Trial included four entries from the Western Regional Variety Trial (WR) and seven entries from the Southwest Region (SWR). Important characteristics for processing chippers include: total yield, tubers per plant, tuber shape, tuber uniformity, average tuber size, and specific gravity. See Tables 10-13 for Chipping Trial results and Figure 3 for entry pictures and comments.

### Trial Information

<b>Location:</b>	Intermountain Research and Extension Center, Tulelake, CA
<b>Soil Type:</b>	Tulebasin mucky silty clay loam
<b>Planting Date:</b>	May 17 <sup>th</sup> 2019
<b>Vine Kill Date:</b>	September 10 <sup>th</sup> and 17 <sup>th</sup> 2019
<b>Days to Vine Kill:</b>	116
<b>Harvest Date:</b>	September 27 <sup>th</sup> 2019
<b>Irrigation:</b>	Solid-set sprinklers; applied water + precipitation = 23.65 inches
<b>Plot Length:</b>	18.3 Feet
<b>In-Row Spacing:</b>	10 Inches
<b>Row Spacing:</b>	36 Inches
<b>Number of Reps:</b>	4
<b># of Fertilizer/Acre:</b>	210-0-150
<b>Seed Treatment:</b>	Maxim 4FS and Fir Bark Dust
<b>Weed Control:</b>	Prowl H2O and Eptam 7E (pre emergence) Matrix SG (early post emergence)
<b>Insecticides:</b>	Admire Pro (In-furrow)
<b>Fungicides:</b>	Quadris (In-furrow)
<b>Vine Kill Method:</b>	Rolling and Reglone at labeled rates

Table 10. Tuber Yield and Size of Chipping Potato Entries.

Clone / Variety	Trial	Total	Tuber Yield (cwt/A) <sup>1</sup>					Culls
			>14 oz	10-14 oz	6-10oz	4-6 oz	<4 oz	
<b>Atlantic</b>	<b>Check</b>	521.8 a	26.5 a	93.6 a	236.5 a	99.2 c	55.5 d	10.6 b
<b>Snowden</b>	<b>WR</b>	483.5 ab	3.8 b	38.0 b	162.5 ab	157.3 a	115.3 abc	6.7 b
<b>CO10073-7W</b>	<b>WR</b>	430.6 ab	4.6 b	14.5 b	119.6 b	122.6 abc	144.7 a	24.7 b
<b>CO10076-4W</b>	<b>WR</b>	468.4 ab	2.7 b	25.2 b	150.1 b	143.0 ab	133.7 ab	13.7 b
<b>CO11023-2W</b>	<b>SWR</b>	401.3 b	5.0 b	28.5 b	143.1 b	111.2 bc	99.4 bc	14.2 b
<b>CO11023-9W</b>	<b>SWR</b>	425.0 ab	6.7 b	45.6 b	162.4 ab	114.0 bc	84.3 cd	12.1 b
<b>CO11037-5W</b>	<b>SWR</b>	440.9 ab	5.6 b	29.3 b	154.7 b	129.6 abc	101.3 bc	20.4 b
<b>TX09403-15W</b>	<b>SWR</b>	447.2 ab	8.7 b	42.7 b	173.2 ab	109.4 bc	94.6 c	18.6 b
<b>TX09403-21W</b>	<b>SWR</b>	457.0 ab	4.3 b	44.8 b	180.7 ab	119.6 abc	90.4 cd	17.3 b
<b>ATTX07042-3W</b>	<b>SWR</b>	483.7 ab	2.8 b	19.6 b	117.3 b	133.3 abc	147.8 a	62.9 a
<b>Mean</b>		<b>455.9</b>	<b>7.1</b>	<b>38.2</b>	<b>160.0</b>	<b>123.9</b>	<b>106.7</b>	<b>20.1</b>

<sup>1</sup>Mean comparisons were performed using Tukey's-Kramer HSD; means with the same letter within columns are not significantly different

Table 11. Merit Score and Tuber Characteristics of Chipping Potato Entries

Clone / Variety	Trial	Merit <sup>1</sup>	Eye depth <sup>2</sup>	Tuber Shape <sup>3</sup>	Shape Uniformity <sup>4</sup>	Length/Depth Ratio <sup>5</sup>	Length/Width Ratio <sup>5</sup>
Atlantic	Check	3.4 a	3.3 a	2.4 a	3.6 a	1.36 a	1.12 ab
Snowden	WR	3.6 a	3.1 a	1.5 ab	3.8 a	1.30 abc	1.02 def
CO10073-7W	WR	3.1 a	3.9 a	1.9 ab	3.6 a	1.39 a	1.11 abc
CO10076-4W	WR	3.0 a	3.5 a	1.5 ab	3.9 a	1.22 bcd	0.97 f
CO11023-2W	SWR	3.1 a	3.4 a	1.6 ab	3.8 a	1.26 abcd	1.02 def
CO11023-9W	SWR	3.5 a	3.9 a	1.1 b	4.1 a	1.16 d	1.00 ef
CO11037-5W	SWR	3.5 a	3.5 a	1.5 ab	3.8 a	1.19 cd	0.99 ef
TX09403-15W	SWR	3.5 a	3.4 a	1.9 ab	3.6 a	1.31 abc	1.08 bcd
TX09403-21W	SWR	3.4 a	3.4 a	1.9 ab	3.5 a	1.28 abcd	1.05 cde
ATX07042-3W	SWR	3.1 a	3.9 a	2.3 a	3.9 a	1.34 ab	1.17 a
<b>Mean</b>		<b>3.3</b>	<b>3.5</b>	<b>1.8</b>	<b>3.8</b>	<b>1.28</b>	<b>1.05</b>

<sup>1</sup> 1=Worst, 5=Best - Chipper Merit Score takes into account multiple factors including tuber shape, eye depth, and shape uniformity

<sup>2</sup> 1=Deep, 5=Shallow

<sup>3</sup> 1=Round, 5=Oblong

<sup>4</sup> 1= No Uniformity, 5=Very Uniform

<sup>5</sup> Ratio of 10 tubers measured from each plot

Table 12. Tuber Defects of Chipping Potato Entries.

Clone / Variety	Trial	Hollow Heart <sup>1</sup>	Vascular Discoloration <sup>1</sup>	Stem End Necrosis <sup>1</sup>	Knobs <sup>2</sup>	Growth Crack <sup>2</sup>	Greening <sup>2</sup>
		%	%	%	%	%	%
Atlantic	Check	0 a	5 a	0 a	0.5 a	0.0 b	1.9 bc
Snowden	WR	0 a	23 a	0 a	0.2 a	0.1 b	1.6 c
CO10073-7W	WR	8 a	13 a	0 a	0.3 a	1.9 b	4.3 a
CO10076-4W	WR	0 a	10 a	0 a	0.8 a	0.5 b	1.7 c
CO11023-2W	SWR	10 a	15 a	3 a	0.4 a	0.8 b	1.4 c
CO11023-9W	SWR	0 a	33 a	0 a	0.7 a	0.0 b	1.9 bc
CO11037-5W	SWR	0 a	25 a	3 a	0.8 a	0.5 b	3.7 ab
TX09403-15W	SWR	3 a	30 a	3 a	0.2 a	2.1 b	1.5 c
TX09403-21W	SWR	3 a	25 a	3 a	0.5 a	1.5 b	1.7 c
ATTX07042-3W	SWR	0 a	15 a	0 a	0.6 a	9.7 a	2.3 bc
<b>Mean</b>		<b>2</b>	<b>19</b>	<b>1</b>	<b>0.5</b>	<b>1.7</b>	<b>2.2</b>

<sup>1</sup> Ten, 6-10oz tubers were evaluated from each plot.

<sup>2</sup> Percent of total tubers.

**Table 13. Disease Susceptibility, Stand, Tuber Set, Average Tuber Size and Specific Gravity of Chipping Potato Entries.**










Clone / Variety	Trial	Vert Wilt Rating <sup>1</sup>	Early-Dying <sup>2</sup> (A.U.D.P.C.)	% Stand	Tubers per Plant	Average Tuber Size (oz)	Specific Gravity
<b>Atlantic</b>	<b>Check</b>	6.3 ab	462.0 b	95 a	7.8 d	6.4 a	1.100 a
<b>Snowden</b>	<b>WR</b>	6.5 a	597.0 ab	94 a	10.1 abc	4.7 bc	1.100 a
<b>CO10073-7W</b>	<b>WR</b>	5.0 bc	222.4 c	95 a	10.1 abc	4.1 c	1.090 bc
<b>CO10076-4W</b>	<b>WR</b>	4.5 cd	139.6 c	94 a	10.3 ab	4.4 bc	1.088 cd
<b>CO11023-2W</b>	<b>SWR</b>	4.0 cd	84.0 c	91 a	8.6 bcd	4.7 bc	1.100 a
<b>CO11023-9W</b>	<b>SWR</b>	3.5 d	52.9 c	93 a	8.3 cd	5.1 b	1.080 d
<b>CO11037-5W</b>	<b>SWR</b>	5.0 bc	124.0 c	94 a	9.1 bcd	4.7 bc	1.098 ab
<b>TX09403-15W</b>	<b>SWR</b>	7.3 a	688.8 a	92 a	8.9 bcd	5.0 b	1.085 cd
<b>TX09403-21W</b>	<b>SWR</b>	7.0 a	608.9 ab	93 a	9.1 bcd	5.0 b	1.085 cd
<b>ATTX07042-3W</b>	<b>SWR</b>	5.0 bc	160.2 c	94 a	11.5 a	4.1 c	1.090 bc
<b>Mean</b>		<b>5.4</b>	<b>314</b>	<b>94</b>	<b>9.4</b>	<b>4.8</b>	<b>1.092</b>

<sup>1</sup>Verticillium wilt ratings based on a 0-9 scale (0=None 9=Dead) for August 29<sup>th</sup> 104 days after planting

<sup>2</sup> Area Under Disease Progress Curve based on foliar early-dying ratings taken 80, 91, 96 and 104 days after planting. Higher value is more susceptible to early dying.



**Figure 3. 2019 Chipping Trial Entries.**

Atlantic	Snowden	CO10073-7W
 <ul style="list-style-type: none"> <li>• Check</li> </ul>	 <ul style="list-style-type: none"> <li>• Check</li> </ul>	 <ul style="list-style-type: none"> <li>• Small average tuber size</li> </ul>
CO10076-4W	CO11023-2W	CO11023-9W
	 <ul style="list-style-type: none"> <li>• 10 % hollow heart</li> <li>• High specific gravity</li> </ul>	 <ul style="list-style-type: none"> <li>• Resistant to early dying</li> <li>• Low specific gravity</li> </ul>
CO11037-5W	TX09403-15W	TX09403-21W
	 <ul style="list-style-type: none"> <li>• Low specific gravity</li> </ul>	 <ul style="list-style-type: none"> <li>• Low specific gravity</li> </ul>

**ATTX07042-3W**

- 10% growth cracks
- High cull yield

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