

2019 POTATO VARIETY TRIALS

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Introduction

New potato varieties were evaluated in 2019 for their productivity and their suitability for fresh market and processing. Potatoes in Malheur County, Oregon, are grown under contract for processors to make frozen potato products for the food service industry and grocery chain stores. There is very little production for fresh pack or open market sales, and very few growers store potatoes on their farms. There is also no local production of varieties for making potato chips.

The varieties grown for processing in Malheur County are mainly ‘Ranger Russet’, ‘Shepody’, and ‘Russet Burbank’. Harvest begins in July and potatoes arrive at processing plants for storage or processing directly from the field.

Prolonged vine health supports increased potato yield, but the “early die” syndrome can limit tuber bulking later than mid-August. Early die causes early senescence of the vines of susceptible varieties such as Shepody and Russet Burbank. A complex of soil pathogens, including bacteria, nematodes, and fungi, particularly *Verticillium* wilt, causes early die in Malheur County. Early die is worse when the crop rotation between potato crops is shorter.

Small acreages of new varieties or advanced selections are sometimes grown under contract to study the feasibility of expanding their use. To replace an existing processing variety, a new potato variety must have numerous outstanding characteristics. The yield should be at least as high as the yield of the currently contracted varieties. The tubers need to have low reducing sugars for light fry color and high specific gravity. A new variety should be resistant to tuber defects or deformities caused by disease, water stress, or heat. It should begin tuber bulking early and grow rapidly for early harvest. Late-harvested varieties resistant to early die can continue bulking into September.

Potato variety development trials at the Malheur Experiment Station in 2019 included the Tri-State Russet Trial with 12 entries, the Oregon Statewide Russet Trial with 35 entries, the Preliminary Yield Russet Trial with 98 entries, the National Fry Processing Trial (NFPT) with 48 entries, the Oregon Statewide Specialty Trial of 13 colored skin and/or flesh potato varieties, the Western Region Specialty Trial of 13 colored skin and/or flesh potato varieties, the Preliminary Yield Specialty Trial of 11 colored skin and/or flesh potato varieties, the Oregon Statewide Chip Trial with 13 entries, and the Preliminary Yield Chip Trial with 27 entries. Through these trials and active cooperation with other scientists in Oregon, Idaho, and Washington, promising new lines are bred and evaluated. Eventually, the lines may be released as new varieties.

Materials and Methods

The potato variety trials were grown in 2019 on Owyhee silt loam, following winter wheat. After the wheat was harvested in 2018, the stubble was shredded and the field was irrigated to sprout unharvested wheat kernels and then the field was disked. Based on a soil test, 50 lb nitrogen (N)/acre 22 lb phosphorus (P)/acre, 166 lb potassium (K)/acre, 100 lb sulfur (S)/acre, 10 lb manganese (Mn)/acre, and 3 lb boron (B)/acre were broadcast in the fall of 2018. The field was fumigated with 20 gal/acre of Telone[®] II and bedded on 36-inch row spacing in the fall of 2018. On April 4, 2019, 100 lb N/acre, 25 lb magnesium (Mg)/acre, and 8 oz/acre of Admire[®] Pro (imidacloprid) were shanked in the bed center.

Seed of all varieties was cut by hand into 2.5-oz seed pieces, treated with Maxim[®] MZ (fludioxonil, mancozeb) dust, and stored briefly to suberize. Potato seed pieces were planted using a 2-row assist-feed planter with 9-inch seed spacing in 36-inch rows. Red potatoes were planted at the end of each plot as markers to separate the potato plots at harvest, except in the specialty trials where russeted potatoes were used as markers.

The Tri-State Russet Trial and the NFPT trial were planted on April 5. The Oregon Statewide Russet Trial, Western Regional Specialty Trial, Oregon Statewide Specialty Trial, and the Oregon Statewide Chip Trial were planted on April 17. The Preliminary Yield Chip Trial, Preliminary Yield Specialty Trial, and Preliminary Yield Russet Trial were planted on April 19.

All trials, except the preliminary yield trials and the NFPT trial, had plots that were a single bed wide with 30 seed pieces (23 ft long) replicated 4 times. The preliminary yield trials had unreplicated plots that were two beds wide with 20 seed pieces (15 ft long). The NFPT trial had plots that were a single bed wide with 15 seed pieces (11 ft long), replicated once for Tier 1 clones, twice for Tier 2 clones, and three times for Tier 3 clones.

After planting, hills were reformed over the rows with a Lilliston rolling cultivator. The herbicides Prowl[®] H₂O (pendimethalin) at 0.95 lb ai/acre, Dual Magnum[®] (S-metolachlor) at 1.27 lb ai/acre, Eptam[®] 7E (S-ethyl dipropylthiocarbamate) at 5 pt/acre, and Roundup[®] at 2 pt/acre were applied as a tank mix for weed control on April 29. The herbicides were incorporated by sprinkler irrigation with approximately 0.5 inch of water. The herbicides Shadow[®] (clethodim) at 10 oz/acre and Matrix[®] (rimsulfuron) at 0.25 oz ai/acre and the fungicide Manzate[®] Pro-Stick (zinc ion + manganese ethylenebisdithiocarbamate) at 1.5 lb/acre were broadcast on May 29. On July 27 and August 16, Agri-Mek[®] (abamectin) at 3.5 oz/acre was broadcast aerially for psyllid control. On August 4, Beleaf[®] (flonicamid) at 2.8 oz/acre was broadcast aerially for psyllid control.

Emergence for the Tri-State Russet and NFPT trials started on May 6. Emergence for the other trials started on May 10. Irrigation scheduling was based on a soil water tension criterion of 50 to 60 cb. Soil water tension was measured at seed piece depth (8-inch depth) using eight Watermark soil moisture sensors (Model 200SS, Irrrometer Co., Inc., Riverside, CA) connected to two RealmFive (Lincoln, NE) Flex dataloggers. Irrigations were managed to maintain the soil water tension below 60 cb. Irrigation decisions were based on the average of all eight sensors. Irrigations started on May 31 and ended on September 3, totaling 23 irrigations.

Fertilization during plant growth was based on weekly petiole and soil solution tests starting May 31 and ending July 31. Based on the tissue and soil tests, a total of 133 lb N/acre, 51 lb K/acre,

6 lb magnesium (Mg)/acre, and 0.5 lb Mn/acre were applied during the growing season. Fertilizer was injected into the sprinkler system during irrigation.

The vines in the Tri-State Russet Trial were flailed on August 7 and on August 15 the potatoes were harvested. For the other trials, the vines were flailed on September 16. The harvest dates for the other trials were September 25 for the NFPT trial, September 26 for the preliminary yield trials, September 30 for the Western Regional Specialty Trial, October 2 for the Oregon Statewide Russet Trial and October 3 for the Oregon Statewide Specialty and Chip trials.

At harvest, potatoes in each plot were lifted with a two-row digger that laid the tubers back onto the soil in each row. At harvest, visual evaluations were made that included observations of desirable traits (i.e., high yield of large, smooth, uniformly shaped and sized, oblong to long, attractively russeted tubers with shallow eyes evenly distributed over the tuber length). Observations were also made of external tuber defects, including growth cracks, knobs, thumbnail cracks, curved or irregularly shaped tubers, pointed ends, stem-end decay, attached stolons, heat sprouts, chain tubers, folded bud ends, scab, rough skin due to excessive russeting, and pigmented eyes. A note was made for each plot to keep or discard the clone based on the overall appearance of the tubers.

Tubers were placed into burlap sacks and placed in a barn where they were kept under tarps until grading. Tubers were graded by market class (U.S. No. 1 and U.S. No. 2) and weight (<4 oz, 4–6 oz, 6–12 oz, and >12 oz). Tubers were graded as U.S. No. 2 if any of the following conditions occurred: growth cracks, bottleneck shape, abnormally curved shape, or two or more knobs. Marketable tubers are U.S. No. 1 and U.S. No. 2 larger than 4 oz. A 20-tuber sample from each plot was placed into storage. The storage temperature was gradually reduced to 45°F.

After 6 weeks in storage, a 10-tuber sample from each plot of the Tri-State Russet Trial, Oregon Statewide Russet Trial, Preliminary Yield Russet Trial, Oregon Statewide Chip Trial, and Preliminary Yield Chip Trial was evaluated for tuber quality traits for processing. Ten tubers per plot of the Tri-State Russet Trial, Oregon Statewide Russet Trial, and Preliminary Yield Russet Trial were cut lengthwise and the 10 center slices were fried for 2.5 min in 375°F soybean oil. For the Oregon Statewide Chip Trial, 10 tubers per plot were cut into 0.06-inch slices and fried for 2.5 min in 375°F soybean oil. Percent light reflectance was measured on the stem and bud ends of each slice for the russet varieties using a Photovolt reflectance meter model 577A (Photovolt Instruments, Inc., Minneapolis, MN), with a green tristimulus filter calibrated to read 0% light reflectance on the black standard cup and 77.1% light reflectance on the white porcelain standard plate. For the chip varieties, fry color was rated subjectively on a scale of 1 to 5, where 1 is lightest and 5 is darkest.

Specific gravity of all varieties was measured from a 10-tuber sample from each plot using the weight-in-air, weight-in-water method. All varieties were evaluated for internal tuber defects from a 10-tuber sample from each plot.

Data from all trials were analyzed with the general linear models analysis of variance procedure in NCSS (Number Cruncher Statistical Systems, Kaysville, UT). Means comparisons were made using Fisher's protected LSD (least significant difference) at the 95% confidence level.

Results and Discussion

In 2019, the Tri-State Russet and NFPT trials were planted close to the ideal planting date of April 7. Due to excessive rainfall starting April 6, planting for the other trials was delayed until April 17. Irrigations were adequate to maintain the soil water tension below the critical level of 50 to 60 cb (Figure 1). Petiole nitrate levels remained below the critical level for most of the season despite the 100 lb N/acre sidedressed preplant and 133 lb N/acre applied during the season (Figure 2). The soil solution N levels remained above the critical level for most of the season, but the total available soil N remained around 40 lb N/acre (Figures 3 and 4). Excessive precipitation in April and May (3.8 inches) could have resulted in movement of soil N below the crop root zone.

Tri-State Russet Trial

All clones except A09022-4, A10007-3, and A10595-13st were within one LSD value from the highest total yield of 766 cwt/acre for Shepody (Table 1). The clones Shepody, AOR10204-3, Ranger Russet, AOR11217-3, A10007-3, and A11194-1 were among the clones with the highest U.S. No. 1 yields.

All clones had specific gravity (measure of tuber solids) higher than 1.08 except clone A10007-3 (Table 1). The only tuber internal defect encountered was blackspot bruise (Table 2). Observations on visual appearance at harvest can be found in Table 3.

Oregon Statewide Russet Trial

Total yields averaged 814 cwt/acre and ranged from 333 cwt/acre for AOR10067-6 to 1127 cwt/acre for AOR10603-5 (Table 4). U.S. No. 1 yields averaged 658 cwt/acre and ranged from 266 cwt/acre for AOR10067-6 to 1025 cwt/acre for AOR10603-5.

Several clones had higher specific gravity and lighter tuber fry color than the check varieties in this trial (Table 4). The tuber internal defects encountered for each clone are listed in Table 5. Observations on visual appearance at harvest can be found in Table 6.

Preliminary Yield Russet Trial

Some of the varieties had higher specific gravity than the three commercial varieties in the trial (Table 7). Of the 95 clones tested, 23 were selected for further testing based on visual observations at harvest (Table 7). Some of the clones had better visual appearance at harvest than 'Russet Norkotah', Ranger Russet, or Russet Burbank.

National Fry Processing Trial (NFPT)

Some varieties had higher yield and processing quality than the commercial varieties (Tables 8 and 9).

Colored Flesh Potato Trials

Potato tubers with red to yellow carotenoid or red, blue, and purple anthocyanin pigments are of interest because of the antioxidant properties of these pigments in human nutrition. Three trials tested colored flesh potato varieties in 2019: Oregon Statewide Specialty, Preliminary Yield Specialty, and Western Region Specialty.

Oregon Statewide Specialty Trial

Total yield averaged 694 cwt/acre and ranged from 258 cwt/acre for OR11157-10 to 917 cwt/acre for NDOR13136Y-1 (Table 10). ‘Chieftain’ had the highest yield of tubers over 14 oz, an undesirable trait. Tuber internal defects for the clones are listed in Table 11. Observations on visual appearance at harvest can be found in Table 12.

Preliminary Yield Specialty Trial

Of the eight clones tested, four were kept for further testing (Table 13).

Western Region Specialty Trial

Total yield ranged from 225 cwt/acre for CO09218-4W/Y to 1099 cwt/acre for ‘Red LaSoda’ (Table 14). Red LaSoda had the highest yield of tubers over 10 oz, an undesirable trait. Tuber internal defects for the clones are listed in Table 15. Observations on visual appearance at harvest can be found in Table 16.

Oregon Statewide Chip Trial

Total yield averaged 802 cwt/acre and ranged from 583 cwt/acre for NYORQ6-3 to 1060 cwt/acre for AOR12197-4 (Table 17).

Clones AOR13136-4 and NYOR14Q9-5 had the highest yield of tubers over 10 oz (an undesirable trait). No tuber internal defects were observed for any clone.

Preliminary Yield Chip Trial

Of the 25 clones evaluated, 7 were kept for further testing (Table 18).

Acknowledgements

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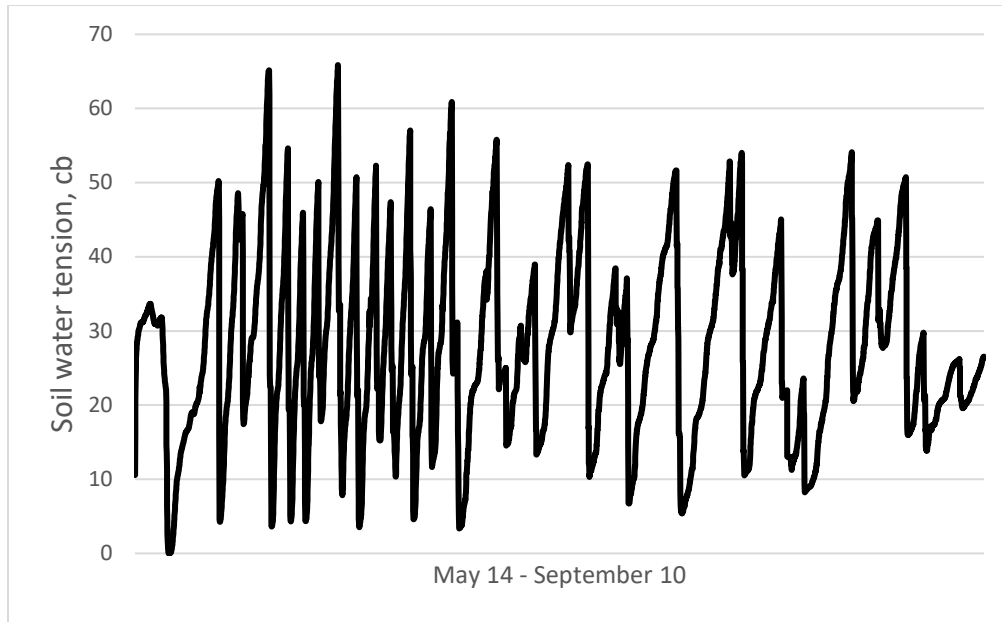


Figure 1. Soil water tension at 8-inch depth over time. Malheur Experiment Station, Oregon State University, Ontario, OR, 2019.

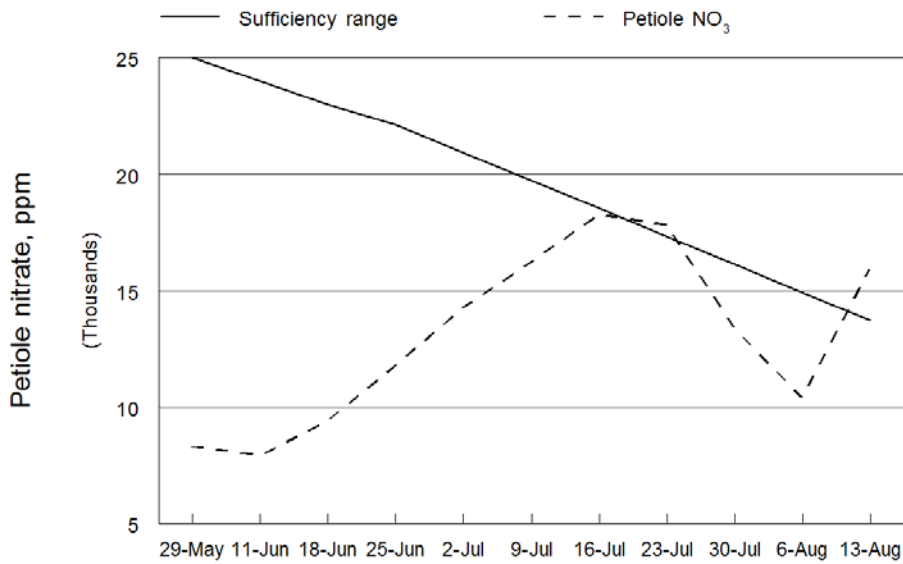


Figure 2. Petiole nitrate over time. Malheur Experiment Station, Oregon State University, Ontario, OR, 2019.

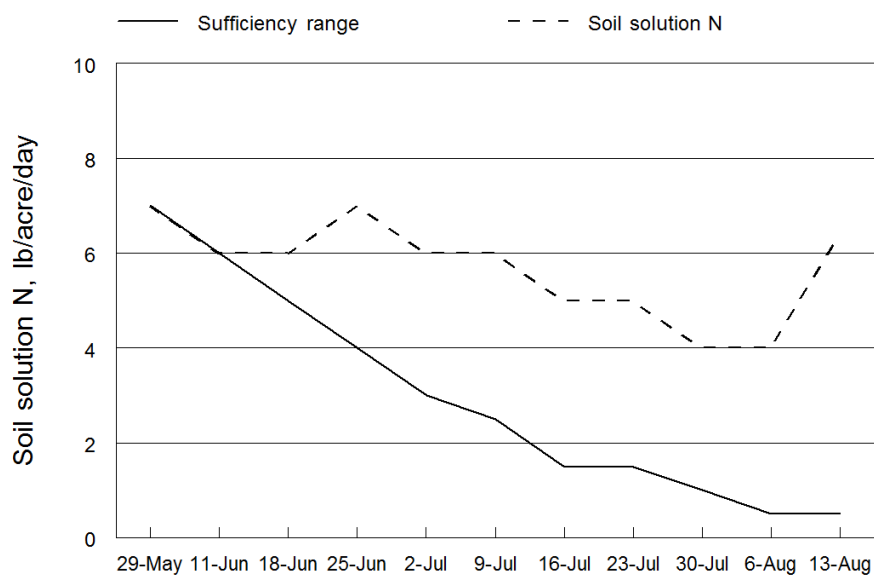


Figure 3. Soil solution nitrogen over time, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019.

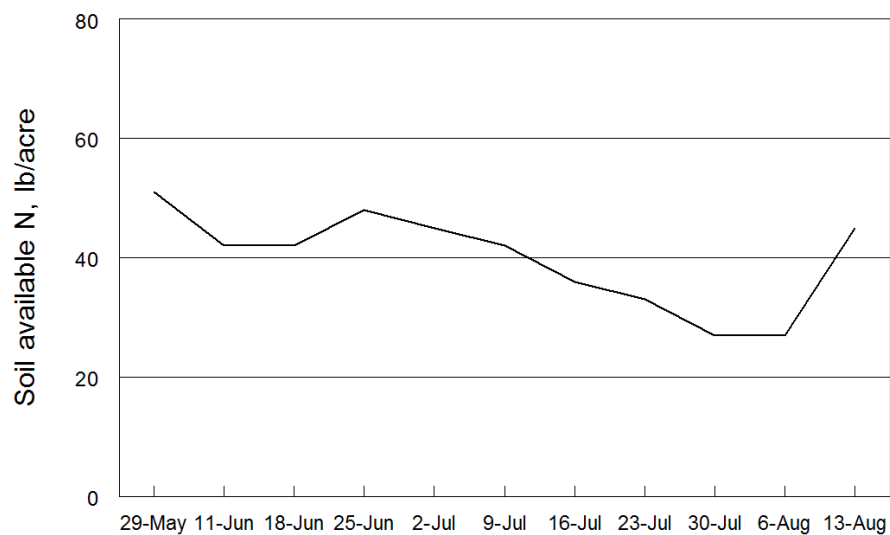


Figure 4. Soil available N ($\text{NO}_3\text{-N} + \text{NH}_4\text{-N}$) over time, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019.

Table 1. Tri-State Russet Trial potato yield, grade, and processing quality, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. Varieties in bold font were retained for further testing.

Variety/Clone	Percent No. 1 %	Total yield	U.S. No. 1				U.S. No. 2	Marketable	<4 oz	Cull	Average tuber weight oz	No. of tubers /plant	Length/width ratio	Specific gravity g•cm ⁻³	Average fry color, light reflectance ----- % -----	Sugar ends	
			Total	>20 oz	10 to 20 oz	6 to 10 oz											4 to 6 oz
Ranger Russet	81.7	738.0	602.7	8.9	119.5	303.5	170.8	12.2	614.9	119.0	4.1	5.1	3.8	1.8	1.094	36.6	0.0
Russet Burbank	68.5	741.3	512.8	0.0	62.1	214.9	235.8	9.4	522.2	211.3	7.8	5.1	3.8	1.8	1.091	31.8	15.0
Russet Norkotah	75.3	711.3	537.9	1.8	107.9	242.8	185.4	7.5	545.3	162.2	3.8	5.0	3.7	1.7	1.083	31.7	22.5
Shepody	85.2	765.7	652.1	23.2	245.3	276.3	107.2	42.3	694.3	68.9	2.4	5.4	4.0	1.6	1.089	38.7	2.5
A09022-4	61.5	559.0	347.1	0.0	17.4	145.1	184.6	5.7	352.9	203.3	2.8	3.8	2.9	1.6	1.085	44.0	0.0
A10007-3	90.6	607.2	550.3	58.4	221.0	196.5	74.3	1.8	552.1	50.6	4.5	4.2	3.1	1.6	1.075	30.7	22.5
A10595-13sto	75.6	565.5	428.6	2.1	96.9	191.8	137.9	15.2	443.8	121.4	0.3	3.9	2.9	1.7	1.085	38.7	0.0
A11194-1	73.9	747.7	551.1	0.0	51.5	280.8	218.8	8.9	560.0	185.7	2.0	5.1	3.9	1.6	1.082	33.4	7.5
AOR08540-1	69.4	743.2	515.5	0.0	14.4	207.2	293.9	4.2	519.7	222.5	1.0	5.1	3.8	1.6	1.097	35.8	7.5
AOR10204-3	83.7	744.8	624.0	0.0	108.8	325.1	190.1	8.1	632.1	111.1	1.6	5.1	3.8	1.8	1.087	36.2	12.5
AOR11217-3	78.3	735.6	577.9	0.0	59.5	273.8	244.6	4.4	582.3	153.3	0.0	5.1	3.8	1.7	1.102	44.8	0.0
COA11013-2	62.0	714.8	444.3	0.0	6.4	149.5	288.4	7.5	451.8	262.4	0.5	5.0	3.7	1.8	1.090	38.1	0.0
Mean	75.5	697.8	528.7	7.9	92.5	234.0	194.3	10.6	539.3	156.0	2.6	4.8	3.6	1.7	1.088	36.7	7.5
LSD (0.05)	6.2	110.7	109.4	16.3	70.9	58.2	44.1	15.0	112.6	29.0	NS	0.8	0.6	0.1	0.005	3.6	13.5

NS = not significant

Table 2. Tri-State Russet Trial tuber internal defects, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019.

Variety/Clone	Vascular discoloration	Hollow heart	Internal brown spot	Blackspot bruise
	----- % -----			
Ranger Russet	0.0	0.0	0.0	2.5
Russet Burbank	0.0	0.0	0.0	0.0
Russet Norkotah	0.0	0.0	0.0	0.0
Shepody	0.0	0.0	0.0	2.5
A09022-4	0.0	0.0	0.0	0.0
A10007-3	0.0	0.0	0.0	0.0
A10595-13sto	0.0	0.0	0.0	0.0
A11194-1	0.0	0.0	0.0	0.0
AOR08540-1	0.0	0.0	0.0	2.5
AOR10204-3	0.0	0.0	0.0	0.0
AOR11217-3	0.0	0.0	0.0	5.0
COA11013-2	0.0	0.0	0.0	0.0
Mean	0.0	0.0	0.0	1.0
LSD (0.05)	NS	NS	NS	NS

NS = not significant

Table 3. Tri-State Russet Trial tuber visual observations at harvest, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. Tuber defect observations are from four plots for each clone. K = clone should be saved, D = clone should be discarded. Capital letters denote a higher intensity of an observation compared to lowercase letters. Since there were four replicates, a clone could be scored for the same attribute up to four times.

Variety/Clone	Disposition	Description
Ranger Russet	2 K, 2k	irregular shape, bottleneck, 3 curved, pointed
Russet Burbank	2 d, 2 k	2 bottleneck, dumbbell, pointed, curved, 3 small
Russet Norkotah	1 K, 3 k	2 small, 2 irregular shape
Shepody	2 K, 2 k	dumbbell, heart shape, 2 curved, 3 irregular shape, bottleneck, pointed
A09022-4	1 D, 2 d, 1 k	Small, 3 small, 2 pointed, irregular shape
A10007-3	4 K	swollen lenticels, pointed
A10595-13sto	4 k	2 small, 3 irregular shape, knobs, heart
A11194-1	1 d, 3 k	irregular shape, 4 small
AOR08540-1	4 k	curved, 2 irregular shape, 4 small
AOR10204-3	2 K, 2 k	heart shape, 2 irregular shape, 2 pointed
AOR11217-3	1 K, 3 k	4 small
COA11013-2	3 d, 1 k	1 Small, 3 small

Table 4. Oregon Statewide Russet Trial potato yield, grade, and processing quality, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. Varieties in bold font were retained for further testing.

Variety/Clone	Percent No. 1	Total yield	U.S. No. 1				U.S. No. 2	Marketable	<4 oz	Cull	Average tuber weight	No. of tubers /plant	Length/width ratio	Specific gravity	Avg. fry color, light reflectance	Sugar ends	
			Total	>20 oz	10 to 20 oz	6 to 10 oz											4 to 6 oz
Ranger Russet	77.1	797.8	615.7	31.0	210.9	246.4	127.4	60.9	676.6	120.8	0.5	5.8	8.3	1.8	1.086	36.2	7.5
Russet Burbank	69.8	946.6	667.5	27.7	134.9	307.8	197.0	103.6	771.1	169.1	6.4	5.8	9.3	1.7	1.084	32.7	12.5
Russet Norkotah	72.7	699.8	517.6	3.9	110.9	255.4	147.4	8.1	525.8	174.0	0.0	4.7	10.2	1.7	1.071	32.3	30.0
AOR12149-1	85.4	870.8	742.4	132.5	377.0	168.6	64.2	90.9	833.3	37.5	0.0	9.7	5.3	1.6	1.083	31.2	17.5
AOR12344-21	84.1	779.7	655.5	9.7	181.8	296.8	167.2	46.8	702.3	76.6	0.8	6.7	8.3	1.6	1.087	36.3	0.0
AOR12347-5	88.3	846.4	747.6	35.6	312.4	278.8	120.9	21.9	769.5	76.9	0.0	7.1	5.8	1.7	1.083	31.9	12.5
AOR12350-5	73.9	906.2	666.0	31.3	245.8	254.2	134.7	138.0	803.9	97.7	4.6	7.3	10.3	1.5	1.079	42.0	0.0
AOR13011-1	90.7	728.5	661.0	48.3	331.5	185.9	95.3	15.8	676.7	47.0	4.7	8.8	6.2	1.7	1.086	39.8	0.0
OR13SPC101-8	83.9	852.2	716.4	29.6	232.6	306.6	147.6	23.8	740.3	90.2	21.7	6.7	5.8	1.5	1.082	35.1	2.5
AOR13064-2	91.7	852.2	780.8	63.0	282.4	297.6	137.9	14.3	795.2	54.7	2.3	7.6	6.8	1.6	1.093	44.8	0.0
AOR10067-5	73.8	509.4	372.8	25.5	163.6	134.5	49.2	100.7	473.5	36.0	0.0	8.0	4.0	1.5	1.068	36.7	5.0
AOR10067-6	78.2	333.2	265.6	1.7	68.4	121.4	74.0	16.7	282.3	46.5	4.4	6.0	4.0	1.9	1.060	33.0	17.5
AOR10093-9	72.4	1056.1	764.4	15.3	237.7	338.6	172.9	141.4	905.9	139.8	10.4	7.0	10.8	2.0	1.069	28.4	35.0
AOR10093-11	84.7	832.9	705.2	6.9	261.4	309.6	127.3	39.1	744.2	88.0	0.6	6.4	6.0	1.6	1.086	39.2	0.0
AOR10129-1	89.7	930.3	833.6	1.8	317.1	387.3	127.5	14.0	847.6	82.7	0.0	6.6	10.2	1.6	1.082	45.8	0.0
AOR10222-3	82.5	771.9	636.1	9.6	220.3	261.1	145.1	34.0	670.1	89.3	12.4	6.7	9.6	1.6	1.092	39.8	5.0
AOR11027-4	87.6	695.0	610.2	85.0	239.8	191.1	94.3	17.2	627.4	67.6	0.0	7.9	6.4	1.7	1.085	40.7	2.5
AOR11192-6	81.6	856.1	700.3	5.6	127.2	350.3	217.3	13.1	713.4	142.7	0.0	5.7	12.5	1.6	1.099	47.9	0.0
AOR11237-1	49.0	1074.1	528.9	1.9	99.3	280.9	146.8	429.4	958.3	107.0	8.8	6.5	11.4	1.7	1.088	35.9	2.5
AOR12082-8	60.1	947.3	569.2	121.3	304.3	102.3	41.3	330.8	900.0	46.5	0.7	9.5	7.4	2.1	1.075	32.7	30.0
AOR14009-3	82.5	951.9	782.6	48.3	393.5	235.6	105.2	74.1	856.7	90.2	5.1	7.2	9.8	1.6	1.076	28.6	60.0
AOR14026-3	83.8	875.5	733.6	13.3	253.9	320.3	146.0	48.7	782.3	83.7	9.6	6.5	7.8	1.6	1.094	27.3	70.0
AOR14033-1	90.5	823.4	748.5	55.5	382.5	242.0	68.4	28.4	776.9	44.8	1.7	8.4	7.0	1.7	1.089	44.5	0.0
AOR14033-11	79.9	656.1	530.3	2.1	95.1	266.8	166.4	24.1	554.4	101.7	0.0	5.6	9.7	1.7	1.089	41.3	0.0
AOR14033-16	88.2	941.7	832.1	162.4	390.1	199.4	80.2	66.9	899.0	42.1	0.5	10.4	6.7	1.6	1.101	35.5	17.5
AOR14051-3	87.1	702.6	611.4	37.4	262.7	225.8	85.5	14.1	625.5	73.5	3.6	7.2	8.1	1.3	1.088	44.7	0.0
AOR12157-16	65.7	671.9	440.7	16.7	89.2	202.6	132.2	84.0	524.7	147.1	0.0	4.8	3.5	1.6	1.088	44.1	2.5
AOR13091-2	81.2	572.7	465.1	1.9	83.5	222.6	157.1	10.0	475.1	96.5	1.1	5.4	7.6	1.8	1.084	43.2	0.0
AOR10603-5	91.0	1127.0	1024.9	206.5	502.6	232.6	83.2	43.5	1068.4	53.4	5.2	10.5	8.0	1.7	1.092	39.1	2.5
AOR10654-11	87.8	1079.6	947.6	84.0	336.8	380.6	146.3	56.3	1003.9	73.9	1.8	7.9	11.4	1.5	1.091	39.3	2.5
AOR11847-15	86.8	928.8	804.6	49.9	349.7	272.1	132.8	13.6	818.2	108.5	2.2	6.9	8.0	1.5	1.078	39.6	2.5
AOR13113-1	77.5	684.8	533.6	16.7	162.9	229.1	124.9	31.2	564.8	118.2	1.8	5.8	6.7	1.7	1.069	30.1	27.5
AOR12312-15	81.6	752.7	614.7	11.6	171.7	281.8	149.6	35.7	650.5	101.9	0.3	5.5	7.4	1.8	1.074	33.8	17.5
OR13SP142-2	81.5	718.5	586.3	31.0	153.9	235.5	165.8	6.2	592.5	125.4	0.6	6.1	8.4	1.6	1.097	40.7	7.5
POR16V2-3	86.3	721.6	622.1	2.6	132.4	306.6	180.6	3.2	625.3	95.5	0.8	5.9	8.5	1.5	1.088	37.9	10.0
Mean	80.8	814.1	658.1	40.8	234.9	255.1	127.4	62.9	721.0	89.9	3.2	7.0	7.9	1.7	1.084	37.5	11.4
LSD (0.05)	6.7	160.3	145.5	42.8	77.4	58.6	38.9	44.1	154.4	29.7	8.7	4.2	1.1	0.1	0.005	5.8	21.7

Table 5. Oregon Statewide Russet Trial tuber internal defects, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019.

Variety/Clone	Vascular discoloration	Hollow heart	Internal brown spot	Blackspot bruise
	----- % -----			
Ranger Russet	0.0	0.0	0.0	5.0
Russet Burbank	0.0	0.0	7.5	0.0
Russet Norkotah	0.0	0.0	0.0	0.0
AOR12149-1	0.0	0.0	0.0	0.0
AOR12344-21	0.0	0.0	0.0	0.0
AOR12347-5	0.0	0.0	0.0	0.0
AOR12350-5	0.0	0.0	0.0	0.0
AOR13011-1	0.0	0.0	0.0	0.0
OR13SPC101-8	0.0	0.0	10.0	0.0
AOR13064-2	0.0	0.0	0.0	0.0
AOR10067-5	0.0	0.0	0.0	2.5
AOR10067-6	0.0	0.0	0.0	7.5
AOR10093-9	0.0	0.0	0.0	0.0
AOR10093-11	0.0	0.0	0.0	0.0
AOR10129-1	0.0	0.0	0.0	0.0
AOR10222-3	0.0	0.0	2.5	0.0
AOR11027-4	0.0	0.0	2.5	0.0
AOR11192-6	0.0	0.0	0.0	0.0
AOR11237-1	0.0	0.0	0.0	0.0
AOR12082-8	0.0	0.0	5.0	0.0
AOR14009-3	0.0	0.0	0.0	0.0
AOR14026-3	0.0	0.0	7.5	2.5
AOR14033-1	0.0	0.0	0.0	0.0
AOR14033-11	0.0	0.0	0.0	0.0
AOR14033-16	0.0	0.0	0.0	2.5
AOR14051-3	0.0	0.0	0.0	0.0
AOR12157-16	0.0	0.0	0.0	0.0
AOR13091-2	0.0	0.0	0.0	0.0
AOR10603-5	0.0	0.0	0.0	0.0
AOR10654-11	0.0	2.5	0.0	0.0
AOR11847-15	0.0	0.0	2.5	0.0
AOR13113-1	0.0	0.0	0.0	0.0
AOR12312-15	0.0	0.0	0.0	2.5
OR13SP142-2	0.0	0.0	0.0	0.0
POR16V2-3	0.0	0.0	0.0	0.0
Average	0.0	0.1	1.1	0.6
LSD (0.05)	NS	NS	NS	NS

NS = not significant.

Table 6. Oregon Statewide Russet Trial tuber visual observations at harvest, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. Tuber defect observations are from four plots for each clone. K = clone should be saved, D = clone should be discarded. Capital letters denote a higher intensity of an observation compared to lowercase letters. Since there were four replicates, a clone could be scored for the same attribute up to four times.

Variety/Clone	Disposition	Description
Ranger Russet	4 d	3 irregular, 4 curved, 2 growth cracks, pointy, bottleneck, growth cracks
Russet Burbank	3 D, d	3 bottleneck, curved, dumbbell, Growth crack, growth crack, bottleneck, Bottleneck, Irregular, irregular, pear
Russet Norkotah	K, 3 d	2 irregular, knobs, 3 small
AOR12149-1	2 k, 2 d	2 growth cracks, 3 irregular, curved, 3 bottleneck, 2 heart, pointy
AOR12344-21	3 k, D	Growth Cracks, growth cracks, pear, 2 irregular, pointy, 2 curved, small
AOR12347-5	3 k, d	2 irregular, 2 pointy, small, growth cracks, knobs, pointy, sticky stolon, pear
AOR12350-5	3 D, d	Irregular, 2 irregular, 4 growth cracks, curved, pear, chain, bottleneck, 2 pointy, chain, pear, Bottleneck, bottleneck, knobs
AOR13011-1	4 K	pear, irregular, 2 heart
OR13SPC101-8	2 D, 2 d	growth cracks, Irregular, 2 irregular, bottleneck, pointy, water rot, 2 round, Round, pear
AOR13064-2	3 k, K	pear, swollen lenticels, irregular, pointy
AOR10067-5	2 D, 2 d	3 Growth Cracks, growth cracks, irregular, 2 round, 2 swollen lenticels, low yield
AOR10067-6	2 k, K, D	3 growth cracks, 3 low yield
AOR10093-9	3 d, k	heart, 2 growth cracks, 2 pointy, 2 curved, 2 irregular, knobs, bottleneck
AOR10093-11	2 D, d, k	3 irregular, Irregular, pointy, small, 2 round, 2 growth cracks, bottleneck, pear, knobs
AOR10129-1	2 k, D, d	3 irregular, 3 pointy, heart, 4 round, pear, heart
AOR10222-3	3 k, K	2 irregular, small, round, 2 growth cracks
AOR11027-4	3k, K	curved, pear, pointy, irregular
AOR11192-6	3 d, k	curved, heart, 2 irregular, 2 pointy, sticky stolon, bottleneck, 2 round, Pear, pear, sprouts
AOR11237-1	4 D	Growth Cracks, 3 growth cracks, sticky stolon, 3 Bottleneck, bottleneck, Curved, curved, pointy
AOR12082-8	4 D	4 knobs, Knobs, 4 curved, irregular, 2 bottleneck, 2 Bottleneck, Knobs, 3 growth cracks, pointy
AOR14009-3	2 D, d, k	2 heart, 3 bottleneck, growth cracks, 4 irregular, pointy, 3 sprouts, 3 knobs
AOR14026-3	3 d, k	heart, 3 irregular, bottleneck, knobs, 2 pear, pointy, Pointy, curved
AOR14033-1	3 k, d	3 irregular, bottleneck, 3 growth cracks, heart, pear, small
AOR14033-11	4 k	pear, 2 bottleneck, irregular, small
AOR14033-16	2 K, 2 d	3 pear, 2 growth cracks, 2 irregular, knobs, curved, pointy, bottleneck
AOR14051-3	2 D, 2 d	4 round, Growth cracks, Irregular, irregular, growth cracks
AOR12157-16	4 D	2 Bottleneck, 2 bottleneck, 4 growth cracks, 4 irregular, small, 2 pointy, heart, round, small, pear
AOR13091-2	K, k, 2 d	sprouts, low yield, curved, 2 small, pointy
AOR10603-5	4 K	2 growth cracks, 2 irregular, 2 heart
AOR10654-11	3 d, k	heart, 4 growth cracks, 4 round, 3 irregular
AOR11847-15	4 d	3 irregular, knobs, round, 2 pear, Pear, pointy
AOR13113-1	2 D, d, k	2 pointy, 2 growth cracks, 4 irregular, heart, round, small, 2 knobs
AOR12312-15	3 d, D	2 knobs, sticky stolon, 3 irregular, small, bottleneck, Chain, chain, pointy, curved, heart, growth cracks
OR13SP142-2	3 k, d	irregular, growth cracks, 2 pear, small, round
POR16V2-3	3 d, k	4 round, sticky stolon, small, irregular, pointy, bottleneck

Table 7. Preliminary Yield Russet Trial specific gravity and subjective visual evaluations for selected varieties, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. K = clone should be saved, D = clone should be discarded. Capital letters denote a higher intensity of an observation compared to lowercase letters. Varieties in bold font were retained for testing in the Oregon Statewide Russet Trial in 2020.

Variety/Clone	Specific gravity g•cm ⁻³	Disposition	Description
Ranger Russet	1.084	k	heart shape, curved, knobs, pointed
Russet Burbank	1.083	d	bottleneck, pointed
Russet Norkotah	1.093	k	short, heart shape, irregular shape
AOR15002-1	1.092	k	blocky, pear
AOR15002-3	1.091	k	short
AOR15033-2	1.086	K	curved
AOR15057-2	1.080	k	round, short, greening
AOR15067-1	1.068	k	growth cracks
AOR15079-9	1.079	k	swollen lenticels, curved
AOR15091-9	1.071	k	curved
AOR15119-1	1.085	k	flat
AOR15123-12	1.091	K	round, irregular shape, pointed
AOR15166-8	1.102	k	Pear, swollen lenticels
AOR14029-1	1.082	k	round, water rot
AOR13020-2	1.095	K	
AOR13020-5	1.092	k	pear, Pointed
AOR13021-2	1.087	k	pear, irregular shape, knobs
AOR13075-1	1.078	K	irregular shape
AOR13093-5	1.090	k	greening, pear
AOR13093-8	1.091	k	round, swollen cracks
POR17RK14-3	1.076	k	deep eyes, pointed, green, growth cracks
POR17RK16-1	1.081	k	heart shape, knobs, growth cracks, deep eyes
AOR15421-4	1.066	k	bottleneck, green, knobs
AOR10667-2	1.082	k	irregular shape
AOR15415-13	1.057	K	knobs
AOR15415-21	1.074	k	heart shape, knobs

Table 8. National Fry Processing Trial yield, grade, and processing quality for Tier 1 varieties (one replicate), Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. Varieties in bold font were retained for further testing in NFPT Tier 2 in 2020.

Variety/Clone	Total yield	>10 oz	6 to 10 oz	4 to 6 oz	U.S. No. 2	<4 oz	Cull	Specific gravity
	cwt/acre							g•cm ⁻³
AAF10943-4	499.5	17.4	129.5	175.7	0.0	177.0	0.0	1.091
AF5521-1	758.3	454.7	173.1	59.5	42.1	28.9	0.0	1.091
NDAF092412-3Russ	770.1	27.0	199.8	210.5	96.8	225.4	10.7	1.081
AF5707-1	959.1	46.5	325.5	353.5	0.0	233.6	0.0	1.087
AF5731-11	684.6	85.3	318.0	196.2	0.0	85.1	0.0	1.103
AF5750-16	776.0	88.3	313.8	170.9	18.2	184.8	0.0	1.095
AF5750-17	839.7	9.3	256.3	300.7	5.0	268.3	0.0	1.081
AF5762-4	1341.3	403.3	512.8	266.8	0.0	158.4	0.0	1.076
AF5789-1	949.8	304.3	351.1	116.3	31.2	123.3	23.6	1.093
ND113100-1Russ	832.6	201.2	387.6	151.5	22.1	70.2	0.0	1.080
ND13242B-8Russ	493.7	18.5	98.5	121.1	32.5	219.3	3.9	1.078
ND13243B-3Russ	682.0	19.2	183.8	119.1	215.7	144.2	0.0	1.077
ND13243B-14Russ	517.3	34.7	156.8	107.3	10.8	204.7	3.0	1.078
ND13288-2Russ	921.5	187.0	334.0	157.7	47.9	194.9	0.0	1.081
AOR11217-3	686.1	124.8	256.5	164.8	0.0	140.0	0.0	1.088
AOR12149-1	907.6	376.9	264.1	102.9	101.3	62.5	0.0	1.077
AOR13064-2	1064.8	284.0	455.6	208.4	0.0	116.8	0.0	1.102
CO11009-3RU	890.3	495.5	244.2	78.3	33.0	39.2	0.0	1.096
CO10094-5RU	361.6	143.5	96.3	48.9	23.5	49.4	0.0	1.080
A09086-1LB	966.5	240.6	395.5	206.5	0.0	123.9	0.0	1.090
A09119-4LB	766.1	182.1	361.3	132.8	12.9	73.2	3.9	1.073
A10007-3	734.1	249.4	89.4	95.8	259.4	40.1	0.0	1.079
A10071-1	796.1	214.8	307.4	158.6	0.0	115.3	0.0	1.074
A10508-2LB	924.6	335.3	370.8	127.9	8.7	76.9	5.0	1.100
A10611-3adg	835.5	47.9	318.2	273.1	12.3	178.4	5.7	1.090
A11188-1	971.0	639.8	244.1	49.2	0.0	38.0	0.0	1.071
A11194-1	699.9	59.4	267.8	171.7	35.2	153.7	12.1	1.076
A11234-2	999.1	241.1	438.3	164.4	12.8	136.3	6.2	1.072
A11326-1	890.7	217.2	368.5	162.6	33.7	103.3	5.4	1.098
A12114-7	730.7	104.0	300.0	142.2	22.1	162.4	0.0	1.091
A12115-16sto	1130.2	80.9	528.3	233.7	9.4	277.9	0.0	1.086
A12314-1sto	946.5	408.9	333.1	136.7	0.0	67.8	0.0	1.099
COA11013-2	779.6	25.6	282.1	209.9	20.4	231.0	10.6	1.085
Mean	821.4	193.0	292.8	162.9	33.5	136.5	2.7	1.085

Table 9. National Fry Processing Trial yield, grade, and processing quality for Tier 2 (two replicates) and Tier 3 (three replicates) varieties, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. Varieties in bold font were retained for further testing in NFPT Tier 3 in 2020.

Tier	Variety/Clone	Total yield	cwt/acre				U.S. No. 2	<4 oz	Cull	Specific gravity g•cm ⁻³
			>10 oz	6 to 10 oz	4 to 6 oz					
2	AF5644-8	543.0	22.3	237.7	142.1	4.4	136.6	0.0	1.101	
	AF5661-13	629.0	134.3	216.4	151.7	0.0	126.7	0.0	1.091	
	NDAF113476CB-3	1090.8	504.5	390.0	133.4	12.7	48.7	1.6	1.107	
	ND12241YB-2Russ	691.9	185.1	204.1	119.7	107.5	75.5	0.0	1.103	
	A10595-13sto	633.8	104.2	151.8	127.4	123.5	126.9	0.0	1.085	
	A11737-1LB	379.4	43.0	100.2	85.8	12.6	137.8	0.0	1.083	
	Mean	661.3	165.6	216.7	126.7	43.4	108.7	0.3	1.095	
	LSD (0.05)	NS	192.0	NS	NS	47.80	NS	NS	NS	
3	AAF10615-1	588.3	203.0	169.4	81.3	11.6	123.1	0.0	1.094	
	AF5492-6	802.6	30.5	252.2	318.7	0.9	200.3	0.0	1.097	
	AOR08540-1	958.0	330.2	390.2	146.2	6.7	81.7	3.1	1.101	
	OR12133-10	1147.6	345.0	479.0	207.7	2.7	107.5	5.9	1.093	
	AO02183-2	1019.2	500.0	325.6	96.6	10.2	86.7	0.0	1.093	
	A07769-4	861.8	265.3	318.5	153.5	13.1	106.8	4.6	1.084	
	A10594-8VR	1090.0	728.2	219.1	80.1	14.3	48.3	0.0	1.108	
	Russet Burbank	839.3	154.0	280.0	157.6	100.1	118.7	28.9	1.093	
	Ranger Russet	866.8	197.5	339.1	121.5	53.6	119.9	35.3	1.093	
	Shepody	843.6	316.2	246.8	82.1	79.7	57.6	61.3	1.083	
	Payette Russet	891.2	250.1	385.6	144.5	8.9	100.0	2.2	1.102	
	Clearwater Russet	902.9	185.3	332.0	211.8	18.5	136.9	18.4	1.088	
	Mean	905.6	305.2	300.4	132.9	45.8	96.9	24.3	1.094	
LSD (0.05)	NS	218.4	154.9	85.6	55.0	NS	NS	0.008		

NS = not significant.

Table 10. Oregon Statewide Specialty Trial yield and grade of colored flesh clones, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. Varieties in bold font were retained for further testing.

Variety/Clone	Total yield	<1% inch	U.S. No. 1					U.S. No. 2	Cull	Average tuber weight	No. of tubers /plant	Length/width ratio	Specific gravity
			<4 oz	4 to 6 oz	6 to 10 oz	10 to 14 oz	>14 oz						
	----- cwt/acre -----								oz			g•cm ⁻³	
Yukon Gold	621.0	4.8	101.2	102.2	217.0	108.0	85.9	6.7	0.0	5.9	8.8	1.1	1.080
Chieftain	833.3	5.1	73.5	124.4	254.1	194.7	164.9	13.6	8.0	7.0	9.9	1.1	1.072
Purple Majesty	796.8	41.1	351.5	182.6	208.6	33.7	5.9	14.6	0.0	3.5	18.9	1.3	1.075
POR16PG17-2	794.8	9.4	156.0	166.1	316.8	112.9	37.3	5.3	0.3	5.3	12.5	1.3	1.067
POR16PG25-2	830.3	19.2	204.4	197.3	286.1	93.1	39.8	6.3	3.5	4.7	14.6	1.3	1.085
POR16PG34-1	667.0	41.2	317.2	182.5	155.5	8.9	0.0	3.0	0.0	3.3	17.0	1.1	1.071
POR16PG35-4	349.7	182.8	341.1	5.4	2.7	0.0	0.0	0.6	0.0	1.0	29.4	1.1	1.064
POR16PG42-4	889.8	73.5	412.5	218.2	199.5	17.6	1.3	40.4	0.3	3.2	23.0	1.2	1.064
NDOR13136Y-1	916.9	24.1	259.6	158.1	193.1	17.8	5.6	282.7	0.0	4.1	18.5	1.4	1.051
OR11157-1	485.3	30.2	298.6	78.0	91.9	8.7	0.0	5.2	3.2	2.1	19.5	3.3	1.062
OR11157-10	257.6	21.3	196.1	32.4	6.2	0.0	0.0	22.9	0.0	2.0	10.9	2.4	1.057
NDOR13140B-1	661.4	19.0	226.5	188.7	225.6	18.5	1.3	0.0	0.9	4.0	13.8	1.0	1.061
POR07NCKP1-5	918.7	94.3	541.1	201.9	135.7	11.8	19.2	9.0	0.0	2.5	30.0	1.4	1.060
Mean	694.0	43.5	267.6	141.4	176.3	48.1	27.8	31.6	1.2	3.7	17.4	1.5	1.067
LSD (0.05)	133.9	19.8	40.0	38.2	48.2	34.7	39.9	33.5	2.1	0.5	3.0	0.1	0.008

Table 11. Oregon Statewide Specialty Trial tuber internal defects of colored flesh clones, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019.

Variety/Clone	Vascular discoloration	Hollow heart	Internal Brown spot	Brown center	Blackspot bruise
----- % -----					
Yukon Gold	0.0	0.0	2.5	0.0	2.5
Chieftain	0.0	0.0	12.5	10.0	5.0
Purple Majesty	0.0	0.0	0.0	0.0	2.5
POR16PG17-2	0.0	0.0	0.0	0.0	0.0
POR16PG25-2	30.0	0.0	2.5	0.0	0.0
POR16PG34-1	0.0	0.0	0.0	0.0	2.5
POR16PG35-4	0.0	0.0	2.5	0.0	2.5
POR16PG42-4	60.0	0.0	2.5	0.0	0.0
NDOR13136Y-1	0.0	0.0	0.0	0.0	7.5
OR11157-1	0.0	0.0	0.0	0.0	2.5
OR11157-10	0.0	0.0	0.0	0.0	0.0
NDOR13140B-1	0.0	0.0	2.5	0.0	2.5
POR07NCKP1-5	0.0	5.0	55.0	20.0	0.0
Mean	6.9	0.4	6.2	2.3	2.1
LSD (0.05)	14.4	2.3	14.3	NS	NS

NS = not significant.

Table 12. Oregon Statewide Specialty Trial tuber visual observations at harvest, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. Tuber defect observations are from four plots for each clone. K = clone should be saved, D = clone should be discarded. Capital letters denote a higher intensity of an observation compared to lower case letters. Since there were four replicates, a clone could be scored for the same attribute up to four times.

Variety/Clone	Disposition	Description
Yukon Gold	3 k, d	greening, 4 oversize, growth cracks, bottleneck, irregular
Chieftain	k, 3 d	4 oversize, growth cracks, sprouts
Purple Majesty	K, 2 k, d	2 knobs, 2 heart, alligator hide, bottleneck
POR16PG17-2	3 k, K	2 irregular, folded bud end, sprouts
POR16PG25-2	2 k, 2 K	3 irregular, dumbbell, heart
POR16PG34-1	2 K, 2 k	
POR16PG35-4	D, 3 d	Sprouts, 3 sprouts
POR16PG42-4	2 d, 2 D	3 chain, 2 sprouts, 2 Sprouts, knobs, rough skin, growth cracks
NDOR13136Y-1	4 D	2 Bottleneck, 2 bottleneck, 4 Sprouts, knobs, 2 growth cracks, pear, dumbbell, curved
OR11157-1	2 K, 2 k	2 curved
OR11157-10	2 d, 2 k	2 knobs, 2 low yield, heart, 2 bottleneck, 2 curved,
NDOR13140B-1	4 K	
POR07NCKP1-5	2 D, 2 d	2 Sprouts, 2 sprouts, bottleneck, growth cracks, 2 irregular, greening

Table 13. Preliminary Yield Specialty Trial specific gravity and subjective visual evaluations of colored flesh clones, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. K = clone should be saved, D = clone should be discarded. Capital letters denote a higher intensity of an observation compared to lowercase letters. Varieties in bold font were retained for further testing in the Oregon Statewide Specialty Trial in 2020.

Variety/Clone	Specific gravity g•cm ⁻³	Disposition	Description
Yukon Gold	1.090	k	greening
Chieftain	1.077	d	too big, deep eyes
Purple Majesty	1.078	d	knobs, pointed
POR17PG57-2	1.079	K	pink flesh, oblong
POR17PG64-2	1.081	k	sprouts
COOR15235-1	1.066	k	big, inconsistent size
COOR15235-2	1.067	k	baby, irregular shape

Table 14. Western Region Specialty Trial yield and grade of colored flesh clones, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. Varieties in bold font were retained for further testing.

Variety/Clone	Total yield	U.S. No. 1					Cull	Average tuber weight	No. of tubers /plant	Length/width	Length/depth	Specific gravity
		<2 oz	2 to 4 oz	4 to 6 oz	6 to 10 oz	>10 oz						
		----- cwt/acre -----						oz		ratio	ratio	g•cm ⁻³
Chieftain	825.1	5.6	89.6	135.5	288.1	300.2	11.7	6.4	10.7	1.1	1.5	1.072
Red LaSoda	1098.6	9.5	68.1	95.3	345.4	583.6	6.2	7.3	12.4	1.1	1.4	1.071
A08112-7R	589.6	34.2	351.0	110.2	121.0	6.8	0.7	2.9	16.6	1.1	1.4	1.077
ATTX05175S-1R/Y	846.0	67.8	541.6	161.9	127.7	9.3	5.5	2.6	26.5	0.9	1.2	1.081
ATX06264s-4R/Y	852.0	19.5	274.9	230.5	258.9	73.7	14.0	4.0	17.5	1.0	1.4	1.080
COTX04193S-2R/Y	768.8	23.7	335.4	201.5	191.1	25.5	15.2	3.4	18.6	1.1	1.6	1.072
Yukon Gold	587.2	8.4	95.6	91.1	199.0	197.1	4.4	5.8	8.4	1.1	1.5	1.080
CO09128-5W/Y	405.1	164.0	397.8	5.8	1.4	0.0	0.1	1.4	23.4	1.0	1.4	1.081
CO09218-4W/Y	224.6	8.8	93.9	65.7	56.3	4.9	3.9	3.2	5.8	1.1	1.6	1.063
CO10064-1W/Y	616.1	23.2	340.3	137.2	127.6	8.0	3.0	3.1	16.6	1.0	1.5	1.104
CO10097-2W/Y	595.7	25.0	313.6	136.3	128.5	11.1	6.2	3.1	15.6	1.0	1.3	1.073
CO10098-5W/Y	522.7	37.8	326.3	89.6	62.4	13.2	31.3	2.7	15.9	1.2	1.8	1.102
POR14PG22-3	1028.7	69.3	591.9	210.1	188.8	19.4	18.5	2.8	30.0	1.1	1.5	1.078
Mean	689.2	38.2	293.8	128.5	161.2	96.4	9.3	3.8	16.8	1.1	1.5	1.080
LSD (0.05)	122.4	16.9	50.5	42.0	56.1	57.6	13.4	0.5	2.8	0.1	0.2	0.006

Table 15. Western Region Specialty Trial tuber internal defects of colored flesh clones, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019.

Variety/Clone	Vascular discoloration	Hollow heart	Internal Brown spot	Brown center	Blackspot bruise
----- % -----					
Chieftain	5.0	0.0	2.5	0.0	2.5
Red LaSoda	0.0	2.5	0.0	2.5	2.5
A08112-7R	0.0	0.0	0.0	0.0	0.0
ATTX05175S-1R/Y	0.0	0.0	0.0	0.0	3.3
ATX06264s-4R/Y	0.0	0.0	0.0	0.0	2.5
COTX04193S-2R/Y	0.0	0.0	10.0	0.0	17.5
Yukon Gold	5.0	0.0	5.0	0.0	7.5
CO09128-5W/Y	0.0	0.0	2.5	0.0	0.0
CO09218-4W/Y	0.0	0.0	0.0	0.0	15.0
CO10064-1W/Y	0.0	0.0	2.5	0.0	5.0
CO10097-2W/Y	32.5	0.0	0.0	0.0	2.5
CO10098-5W/Y	0.0	0.0	0.0	0.0	2.5
POR14PG22-3	0.0	0.0	15.0	0.0	7.5
Mean	3.3	0.2	2.9	0.2	5.3
LSD (0.05)	7.0	NS	NS	NS	10.4

Table 16. Western Region Specialty Trial tuber visual observations at harvest, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. Tuber defect observations are from four plots for each clone. K = clone should be saved, D = clone should be discarded. Capital letters denote a higher intensity of an observation compared to lowercase letters. Since there were four replicates, a clone could be scored for the same attribute up to four times.

Variety/Clone	Disposition	Description
Chieftain	4 k	too big, growth cracks, 3 oversize, heart, bottleneck
Red LaSoda	2 d, D, k	3 Folded bud end, folded bud end, irregular, 4 oversize, growth cracks, sprouts
A08112-7R	2 d, k, K	4 sprouts, Greening
ATTX05175S-1R/Y	2 k, 2 K	2 sprouts
ATX06264s-4R/Y	k, 3 K	2 sprouts, growth cracks
COTX04193S-2R/Y	k, 3 K	pointy, 2 sprouts, chain
Yukon Gold	d, 3 k	oversize, knobs, growth cracks, inconsistent size, greening
CO09128-5W/Y	2 k, 2 K	2 sprouts, uniform size, sprouts
CO09218-4W/Y	k, D, 2 d	2 greening, pointy, 3 low yield, bottleneck, growth cracks, heart, chain, 2 sprouts, irregular
CO10064-1W/Y	3 k, K	sprouts, chain, 2 greening
CO10097-2W/Y	3 k, K	greening
CO10098-5W/Y	D, 3 k	pointy, Sprouts, 3 sprouts, knobs, nice color, pointy, knobs, bottleneck, knobs
POR14PG22-3	3 d, D	4 Sprouts, 2 knobs, irregular

Table 17. Oregon Statewide Chip Trial yield and grade, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. Varieties in bold font were retained for further testing.

Variety/Clone	Total yield	>10 oz	6 to 10 oz	4 to 6 oz	<4 oz	>4 inch	No. 2	Cull	Average tuber weight	No. of tubers /plant	Length/width ratio	Specific gravity	Fry color ^a	Sugar end
									oz			g•cm ⁻³	0 - 5	%
----- cwt/acre -----									oz		ratio	g•cm ⁻³	0 - 5	%
Atlantic	841.4	121.4	319.9	215.5	173.7	54.6	3.4	7.5	5.1	13.5	1.14	1.090	2.4	62.5
Snowden	893.7	66.8	354.8	269.4	201.3	14.2	1.0	0.4	4.9	15.0	1.01	1.092	2.2	52.5
AOR12197-4	1059.8	184.1	423.8	242.6	203.5	42.4	3.4	2.4	5.4	16.3	1.04	1.090	1.8	27.5
AOR13136-4	1038.6	463.2	347.9	128.6	92.3	223.4	1.2	5.4	7.4	11.6	1.06	1.088	2.0	40.0
NYOR14Q9-5	822.8	443.0	245.7	75.1	55.1	240.9	0.0	3.9	7.9	8.6	1.10	1.084	1.6	12.5
NYOR14Q9-9	888.2	160.6	341.1	205.6	179.2	44.7	1.0	0.7	5.1	14.4	1.10	1.087	2.3	55.0
COOR13270-2	670.4	64.0	187.8	175.4	242.7	22.4	0.6	0.0	4.2	13.2	1.12	1.085	1.8	20.0
NYORQ2-2	730.5	194.8	224.1	145.5	141.1	99.8	23.7	1.5	5.3	11.4	1.20	1.081	1.7	17.5
NYORQ6-3	582.9	167.8	219.7	109.1	85.0	52.6	0.0	1.4	5.9	8.2	1.10	1.083	1.6	15.0
NYORQ6-6	648.2	215.4	241.6	93.0	83.0	76.4	3.0	12.2	6.4	8.4	1.03	1.089	1.7	12.5
NYORN6-8	917.9	115.0	319.3	239.9	241.4	46.6	1.4	1.1	4.7	16.3	1.16	1.076	2.1	37.5
NYORN18-1	598.8	177.7	215.5	104.6	83.4	88.2	17.7	0.0	6.1	8.1	1.09	1.067	2.5	57.5
NYORN41-5	728.2	105.0	218.6	207.7	189.4	31.1	2.2	5.3	4.2	14.2	1.06	1.088	1.7	15.0
Mean	801.6	190.7	281.5	170.1	151.6	79.8	4.5	3.2	5.6	12.2	1.09	1.085	1.9	32.7
LSD (0.05)	134.6	81.6	58.9	36.6	32.2	54.3	NS ^b	6.5	0.7	1.6	0.06	0.006	0.5	27.9

^aFry color was rated subjectively on a scale of 1 to 5, where 1 is lightest and 5 is darkest.

^bNS = not significant.

Table 18. Preliminary Yield Chip Trial specific gravity and subjective visual evaluations, Malheur Experiment Station, Oregon State University, Ontario, OR, 2019. K = clone should be saved, D = clone should be discarded. Capital letters denote a higher intensity of an observation compared to lowercase letters. Varieties in bold font were retained for further testing in the State Chip Trial in 2020.

Variety/Clone	Specific gravity g•cm ⁻³	Disposition	Description
Atlantic	1.101	k	deep eyes, sticky stolon, greening
Snowden	1.093	k	folded bud end, greening, sticky stolon
NDOR13317CB-2	1.082	k	flat
NDOR13320CAB-2	1.097	k	
NDOR1445ABC-2	1.096	k	greening, folded bud end, sticky stolon
NDOR14119B-1	1.078	k	folded bud end, sticky stolon
NDOR14132Y-5	1.081	k	green, swollen lenticels
AOR13125-4	1.078	k	
AOR13125-7	1.093	k	