

CLASSIC RUSSET CHARACTERISTICS

Proposed name: **Classic Russet**
Experimental designation: A95109-1
Botanical name: Solanum tuberosum L.
Intended Market: Fresh Market/ Early French fry processing

General Description:

Classic Russet is a product of the cooperative USDA/ARS, University of Idaho breeding program in Aberdeen, Idaho. It resulted from a 1995 cross between Blazer Russet and Summit Russet (Figure 1). It has been evaluated for over 12 years in public and industry trials throughout the western U.S. The release will be made jointly by the USDA/ARS and the experiment stations of Idaho, Washington, and Oregon.

Classic Russet is an early to medium maturing variety with early bulking potential and high yield of oblong-long, medium-russeted tubers having higher protein content than those of standard potato varieties. This variety has moderate specific gravity and resistances to sugar ends, tuber malformations and most internal and external defects. Classic Russet also has excellent culinary qualities that are comparable to Russet Burbank—the industry standard for culinary quality.. It shows good potential for early processing and fresh markets, with the fresh industry viewing Classic Russet as a replacement for Russet Norkotah—an early harvest variety widely grown in the U.S.

Plant Characteristics:

Classic Russet has an erect, medium vine that matures relatively late in the season, but has the ability to bulk early. It produces white flowers with sterile pollen production.

Table 1. Foliage characteristics of Classic Russet compared with those of Russet Burbank. Comparisons were made on plants growing in Aberdeen, Idaho in 2005 and 2006.

Characteristic	Classic Russet	Russet Burbank
Maturity	Medium	Late
Flower color	White	White
Pollen production (male fertility)	Sterile	Sterile

Tuber Characteristics:

Classic Russet produces oblong-long tubers with brown, russet skin. The eyes are shallow in depth, intermediate in number, and are evenly distributed. Tuber set is low, and tuber size is large (Table 2).

Table 2. Physical tuber characteristics of Classic Russet compared with those of Russet Burbank. Comparisons were made using tubers grown at Aberdeen, Idaho in 2005 and 2006.

Characteristic	Classic Russet	Russet Burbank
Skin Color	Brown	Tan
Skin texture	Russet	Russet
Size ¹	Large (Ave. 9.5 oz)	Medium (Ave. 6.8 oz)
Shape	Oblong –Long (3.9 ²)	Long (4.4)
Thickness	Medium-thick	Slightly flattened
Length to width ratio	1.89	2.10
Length to depth ratio	2.00	2.46
Eye depth	Shallow	Intermediate
Eye number	Intermediate	High
Eye distribution	Evenly distributed	Evenly distributed
Eyebrow prominence	Prominent	Slight prominence
Flesh color	Cream-white	Cream-white
Tuber set	Low (6.7)	Medium-low (9.3)
Dormancy	Medium	Long

¹ Tuber size data was collected from 8 trials grown in Idaho, Oregon, and Washington in 2004-2006.

² Shape is a 1-5 rating scale with 1 = round and 5 = long and narrow; data taken from 24 trials between 2004 and 2006.

Tuber Yield:

In early harvest trials, Classic Russet produced slightly lower average total yields than Ranger Russet and Russet Norkotah in western Idaho, but higher total yields in Oregon and Washington (Table 3). However, Classic Russet produced comparable U.S. No. 1 yields to Ranger Russet and Russet Norkotah in western Idaho and significantly higher U.S. No. 1 yields in Oregon and Washington (Table 3). Yields of tubers greater than 12 oz were consistently higher for Classic Russet than Ranger Russet and Russet Norkotah at all early harvest locations.

In late harvest trials, Classic Russet produced average total yields that were lower than Ranger Russet in eastern Idaho but similar to Ranger Russet in western and central Idaho as well as Oregon and Washington (Table 4). Classic Russet produced higher total yields than Russet Burbank in Washington but lower total yields at all other locations. Classic Russet produced considerably higher U.S. No. 1 yields than Russet Burbank in all late harvest trial locations and higher U.S. No. 1 yields than Ranger Russet at all locations except eastern Idaho.

Table 3. Total yield, U.S. No. 1 yield, and percent yield greater than 12 ounces of Classic Russet as compared to those of Ranger Russet and Russet Norkotah in early harvest trials.

Location	Variety	Total Yield (cwt/A)	U.S. No. 1 Yield (cwt/A)	Percent Yield > 12 oz. (%)
Western Idaho ¹	Classic Russet	372	330	26
	Ranger Russet	405	317	23
	Russet Norkotah	383	332	19
Oregon ²	Classic Russet	549	490	32
	Ranger Russet	548	442	21
	Russet Norkotah	482	390	10
Washington ³	Classic Russet	581	530	26
	Ranger Russet	536	472	22
	Russet Norkotah	551	476	17

¹ Data from 6 trials conducted from 2001-2006 in Parma, ID.

² Data from 5 trials conducted from 2004-2006 in Hermiston and Malheur, OR.

³ Data from 3 trials conducted from 2004-2006 in Othello, WA.

Table 4. Classic Russet total and U.S. No. 1 yields as compared to those of Ranger Russet and Russet Burbank in late harvest trials.

Location	Variety	Total Yield (cwt/A)	U.S. No. 1 Yield (cwt/A)
Eastern Idaho ¹	Classic Russet	428	376
	Ranger Russet	467	382
	Russet Burbank	445	282
Western and Central Idaho ²	Classic Russet	478	439
	Ranger Russet	480	351
	Russet Burbank	553	323
Oregon ³	Classic Russet	678	603
	Ranger Russet	674	496
	Russet Burbank	709	357
Washington ⁴	Classic Russet	651	596
	Ranger Russet	652	555
	Russet Burbank	586	375

¹ Data from 6 trials conducted from 2003-2006 in Aberdeen, Shelley and Rexburg.

² Data from 3 trials conducted from 2004-2006 in Kimberly.

³ Data from 9 trials conducted from 2004-2006 in Hermiston, Klamath Falls, and Malheur, OR.

⁴ Data from 3 trials conducted from 2004-2006 in Othello, WA.

Tuber Quality Characteristics

In 18 trials grown in Idaho, Oregon, and Washington, average specific gravity and percent solids for Classic Russet were lower than Ranger Russet, similar to Russet Burbank and higher than Russet Norkotah (Table 5). Classic Russet produced slightly darker colored fries out of 45°F storage than Ranger Russet but slightly lighter colored fries than Russet Burbank and Russet Norkotah.

Table 5. Tuber specific gravity French fry color of Classic Russet as compared with Ranger Russet, Russet Burbank, and Russet Norkotah.

Characteristic	Classic Russet	Ranger Russet	Russet Burbank	Russet Norkotah
Specific gravity ¹	1.079	1.087	1.079	1.071
Fry color (45°F storage) ²	1.6	1.4	1.8	1.9
Solids (%)	20.6	22.1	20.6	19.6

¹ Specific gravity data from 18 trials grown in Idaho, Oregon and Washington.

² French fry color data from 18 (45°F) trials grown in Idaho, Oregon and Washington. USDA color chart [00 – 4.0(darkest)]

Storage Characteristics

Classic Russet has a shorter, natural dormancy than RB (20-45 days shorter, depending on temperature and year). On average, Classic Russet has a dormancy length of 155 days at 42°F, 130 days at 45°F, and 100 days at 48°F. Fusarium dry rot results indicate that this cultivar is similar in susceptibility to RB and thus classified as moderately resistant. Weight loss during extended storage was significantly higher than RB at all temperatures. However the differences between RB and Classic Russet were relatively small; on average Classic Russet was approximately 2 percentage points higher in total weight loss than RB. Glucose concentrations at 42°F in Classic Russet increase steadily in storage and reach a maximum at ~150 days after harvest (DAH) of 0.15-0.20% fresh weight (FW), depending on the year. At both 45°F and 48°F, glucose increases at a much lower rate than at 42°F. Maximum concentrations were below 0.10% and occurred approximately 130 DAH in all years. Overall, the glucose and sucrose profiles over the three storage seasons were similar to RB. On average, mean stem end fry color was USDA 3 and 4 at 42°F, USDA 2 at 45°F and USDA 1 or below at 48°F. Mottling, which is a dark, thread-like coloration within the fries, was observed at a moderate level at 42°F, mild at 45°F and mild to none at 48°F.

Internal and External Defects

Classic Russet has generally demonstrated less susceptibility to growth cracks, second growth, and blackspot bruise than Russet Burbank, Ranger Russet and Russet Norkotah particularly under stress conditions (Table 6) but it has shown greater susceptibility to shatter bruise. Hollow susceptibility has been relatively low.

Table 6. Internal and external defects of Classic Russet tubers compared with those of Ranger Russet, Russet Burbank, and Russet Norkotah. Data taken are from trials grown in Idaho, Oregon and Washington from 2003-2006.

Defect	Classic Russet	Ranger Russet	Russet Burbank	Russet Norkotah
Growth cracks ¹	4.8	4.5	3.4	4.8
Second growth ¹	4.9	4.6	3.8	4.7
Shatter bruise ¹	2.7	2.5	2.7	2.5
Blackspot bruise ¹	2.9	2.1	2.5	2.1
Hollow heart/Brown Center ²	2%	0.1%	6%	4%

¹ Growth cracks, second growth, shatter bruise, and blackspot bruise rated on a scale 1-5 where 1 = severe occurrence of the defect and 5 = no occurrence of the defect.

² Hollow heart/Brown Center measured as percent of >12 oz tubers with the defect.

Biochemical Composition:

Classic Russet tubers have exhibited lower reducing sugar concentrations than Ranger Russet, Russet Burbank and Russet Norkotah in trials conducted at Aberdeen, but intermediate sucrose concentrations (Table 7). Glycoalkaloid concentrations for Classic Russet were lower than the other three varieties while protein concentrations were 22% to 32% greater, indicating Classic Russet can provide an enhanced level of dietary protein relative to standard potato varieties. Vitamin C concentrations were lower than Ranger Russet (a variety known for its high vitamin C concentration) but were similar to Russet Burbank and Russet Norkotah.

Table 7. Biochemical composition of Classic Russet tubers compared with those from Russet Burbank. Data was taken from three trials grown from 2004-2006 at Aberdeen, Idaho.

Component	Classic Russet	Ranger Russet	Russet Burbank	Russet Norkotah
Glycoalkaloids (mg/100g)	0.8	3.1	3.2	1.8
Reducing sugars (% FWB)	0.08	0.11	0.11	0.14
Sucrose (% FWB)	0.18	0.20	0.16	0.14
Protein (%DWB)	6.6	5.4	5.0	5.3
Vitamin C (mg/100g)	25.2	34.6	23.2	24.8

Sensory Evaluations:

Sensory quality for Classic Russet has been comparable to Russet Burbank in both pre- and post-storage evaluations (Table 8), indicative of its excellent culinary qualities.

Table 8. Results of University of Idaho sensory evaluations of Classic Russet and Russet Burbank baked potatoes.¹

Variety	<u>Pre-storage²</u>				<u>Post-storage³</u>			
	Color	Texture	Flavor	General	Color	Texture	Flavor	General
Classic Russet	6.5	5.6	5.6	5.6	6.6	5.7	5.7	5.9
Russet Burbank	6.4	5.9	5.6	5.7	6.4	5.9	5.6	5.8

¹Tests consisted of ten sessions, each involving 10-12 trained panelists, conducted over 4 years, 2004-2006. Tubers were rated for color, texture, flavor, and general appeal on a 1-9 scale with 1=very poor quality, 9=exceptionally good quality.

²Pre-storage evaluations were conducted in early November, approximately 1 month after harvest, and before the storage temperature was brought to its final holding point.

³Post-storage evaluations were conducted in March, after 5-6 months storage at approximately 4.4°C.

Disease Reactions:

Classic Russet resistance to most diseases is comparable to that of Russet Burbank, although it is somewhat more resistant to dry and soft rot (Table 9).

Table 9. Disease reactions of Classic Russet tubers compared with those of Ranger Russet and Russet Burbank.

Disease ¹	Classic Russet	Ranger Russet	Russet Burbank
Verticillium wilt (Verticillium)	S	MR	S
Foliar Early Blight (Alternaria)	MS	S	S
Tuber Early Blight (Alternaria)	MS	MS	MS
Late Blight (Phytophthora)	S	S	S
Late Blight (tuber)	S	VS	S
Common Scab (Streptomyces)	MR	S	MR
Corky Ringspot	MS	S	S
Root-knot Nematode	S	S	S
Dry Rot (Fusarium)	MR	MS	S
Dry rot (<i>F. sol.</i> var. <i>coer.</i>)	MR	MS	S
Soft Rot (Pectobacterium)	S	MS	S
PVX ²	VS	R	VS
PVY ⁰	S	MR	S
PLRV Foliar Infection	S	S	VS
PLRV Net	S	MS	S
Necrosis/serious defect	S	MS	S

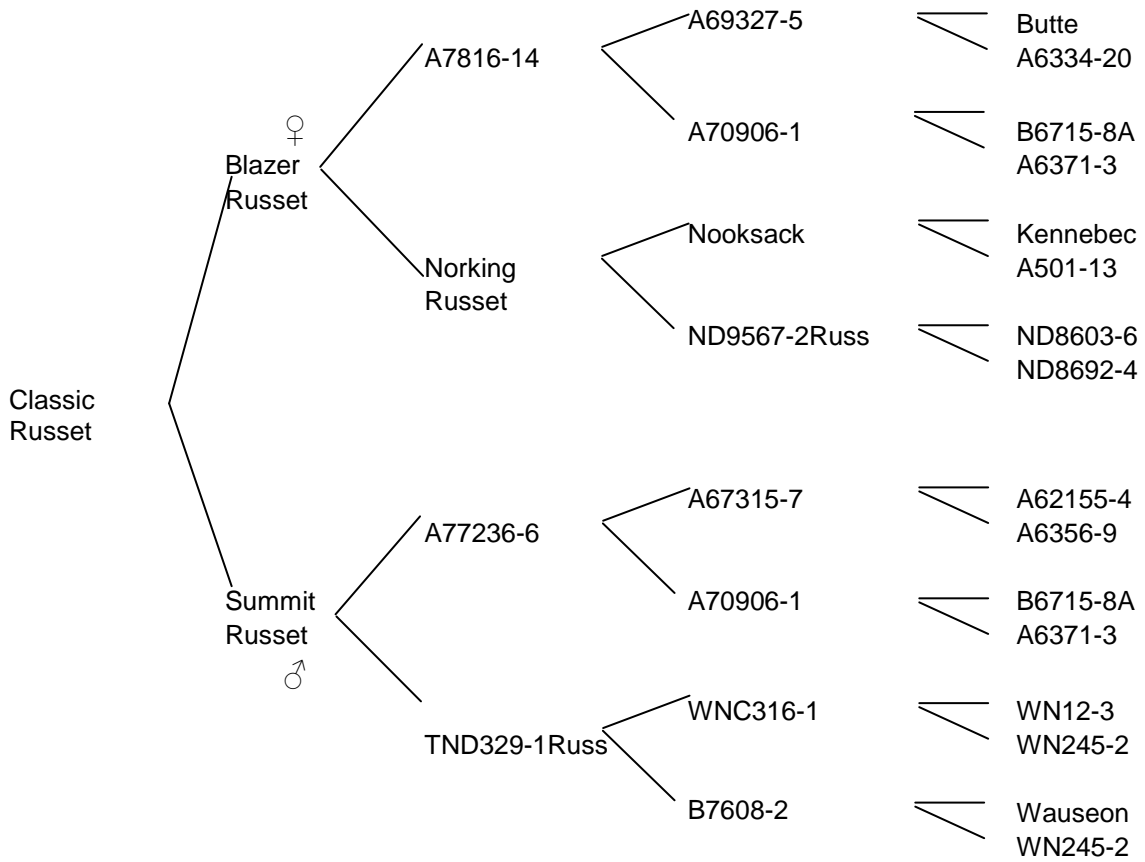
¹ Responses of Classic Russet to diseases were based on a minimum of two years of controlled field evaluations. Responses were defined as: very resistant (VR), resistant (R), moderately resistant (MR), moderately susceptible (MS), susceptible (S), and very susceptible (VS).

Disease evaluations were conducted at the following locations: Verticillium wilt: Aberdeen, ID and Hermiston, OR; Pink rot: Parker, ID; Common scab: Aberdeen, ID and Antigo, WI; Early blight, *Pectobacterium* (Erwinia) soft rot, Fusarium dry rot : Aberdeen, ID; Powdery scab of tuber: Potter County, PA, Parker, ID, and Suring, WI; Powdery scab of roots: Parker, ID; Viruses and PLRV net necrosis: Kimberly, ID; Late blight: Corvallis, OR; Corky ringspot: Prosser, WA.

² Virus responses are based on seed borne infections as determined by ELISA, following field infection with PLRV from aphid vectored sources of inter-planted virus infected potato, mechanical inoculation and aphid vectored PVY, and mechanical inoculation with PVX.

#PLRV necrosis/serious defect readings are from a percentage of tubers with net necrosis that extends more than ¼ inch into the tuber resulting in a “serious defect.”

Pedigree of Classic Russet



CLASSIC RUSSET

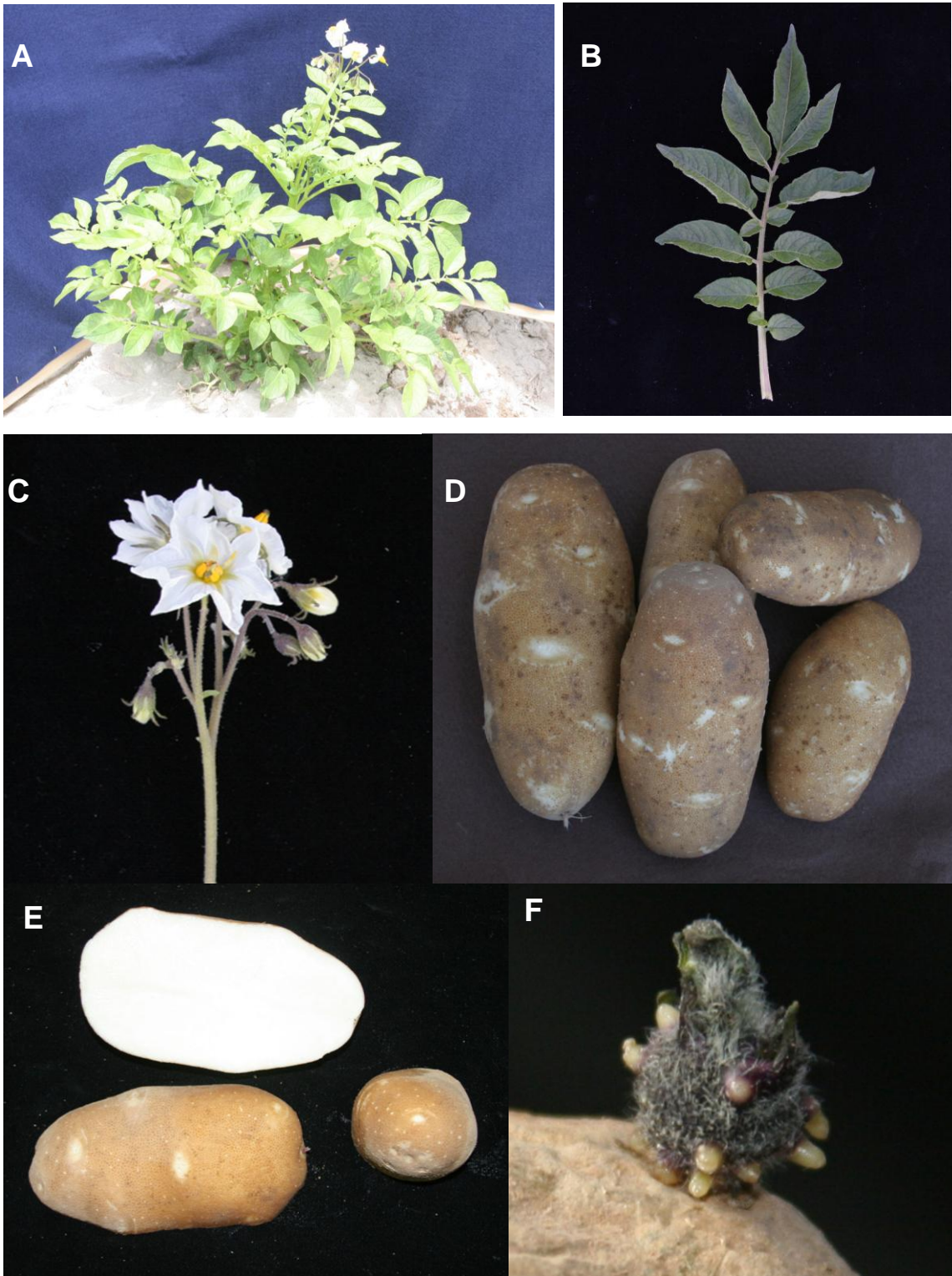


Figure 2. Photographs of A95109-1 showing a) whole plant, b) compound leaf, c) flower, d) field tubers, e) external tuber appearance and tuber flesh color, and f) light sprout.