

ALPINE RUSSET CHARACTERISTICS

Proposed name: **Alpine Russet**
Experimental designation: A9305-10
Botanical name: Solanum tuberosum L.
Intended Market: Primarily Processing Market

General Description:

Alpine Russet is a product of the cooperative USDA/ARS, University of Idaho breeding program in Aberdeen. It resulted from a 1993 cross between breeding clones A83043-12 and A85103-3 and has been evaluated for over 13 years in public and industry trials throughout the western U.S. Alpine Russet is a high yielding, medium to late maturing cultivar with oblong tubers, light russet skin and good processing quality following long-term storage. It has moderately high specific gravity, resistances to sugar ends, tuber malformations and most internal and external defects. It is notable for a tuber dormancy most similar to that of Russet Burbank, making it an excellent candidate for long-term storage, with processing characteristics superior to that of Russet Burbank. The release will be made jointly by the USDA/ARS and the experiment stations of Idaho, Washington, and Oregon.

Plant Characteristics:

Alpine Russet has a semi-erect, medium vine that matures relatively late in the season. It produces red-purple flowers with fertile pollen (Table 1).

Table 1. Foliage characteristics of Alpine Russet compared with those of Russet Burbank. Comparisons were made on plants growing in Aberdeen, Idaho in 2003-2004.

Characteristic	Alpine Russet	Russet Burbank
Maturity	Medium-Late	Late
Flower color	Red-purple	White
Pollen production	Yes-fertile	None

Tuber Characteristics:

Alpine Russet produces oblong tubers with medium thickness and light russet skin. The eyes are shallow in depth and intermediate in number and are predominately apical. Tuber set is low, and tuber size is medium large (Table 2).

Table 2. Physical tuber characteristics of Alpine Russet compared with those of Russet Burbank. Comparisons were made using tubers grown at Aberdeen, Idaho in 2003-2004.

Characteristic	Alpine Russet	Russet Burbank
Skin Color	Tan	Brown
Skin texture	Russet	Russet
Size ¹	Medium-large(Ave. 8.6 oz)	Medium (Ave. 7.2 oz)
Shape	Oblong (3.7)	Long (4.0)
Thickness	Medium thick	Slightly flattened
Eye depth	Shallow	Intermediate
Eye number	Intermediate	High
Eye distribution	Predominately apical	Evenly distributed
Eyebrow prominence	Prominent	Slight prominence
Flesh color	Cream-white	Cream-white
Tuber set	Low (6.7 ²)	Low (8.8)
Dormancy	Long	Long

¹ Tuber size data were collected from 18 trials grown in Idaho, Oregon and Washington in 2002-2004.

² Tuber Set; data taken from 3 trials between 2002 and 2004.

Tuber Yield:

Alpine Russet consistently produced higher average total and U.S. No. 1 yields than either Ranger Russet or Russet Burbank in 23 late harvest trials grown in eastern Idaho, Western and Central Idaho, Oregon and Washington (Table 3). Total yields for Alpine Russet were 6 to 19% higher than Ranger Russet and 5 to 28% higher than Russet Burbank, while U.S. No. 1 yields were 3 to 28% higher than Ranger Russet and 30 to 68% higher than Russet Burbank.

Table 3. Total and U.S. No. 1 yields for Alpine Russet 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	Alpine Russet	563	454
	Ranger Russet	476	389
	Russet Burbank	441	270
Western and Central Idaho ²	Alpine Russet	521	442
	Ranger Russet	476	344
	Russet Burbank	499	321
Oregon ³	Alpine Russet	753	556
	Ranger Russet	632	481
	Russet Burbank	660	368
Washington ⁴	Alpine Russet	765	640
	Ranger Russet	724	622
	Russet Burbank	698	494

¹ Data from 7 trials conducted from 2002-2004 in Aberdeen, Shelley, and Rexburg, Idaho.

² Data from 4 trials conducted from 1999-2004 in Kimberly and Parma, Idaho.

³ Data from 9 trials conducted from 2002-2004 in Hermiston, Malheur, and Klamath Falls, OR.

⁴ Data from 3 trials conducted from 2002-2004 in Othello, WA.

Tuber Quality Characteristics:

In 18 trials grown in Idaho, Oregon, and Washington, average specific gravity and percent solids for Alpine Russet were intermediate between Russet Burbank and Ranger Russet (Table 4). Alpine Russet produced significantly lighter colored fries than either Ranger Russet or Russet Burbank out of 45°F storage.

Table 4. Tuber specific gravity french fry color of Alpine Russet as compared with Ranger Russet and Russet Burbank.

Characteristic	Alpine Russet	Ranger Russet	Russet Burbank
Specific gravity ¹	1.082	1.086	1.077
Fry color (45°F storage) ²	0.7	1.1	1.6
Solids (%)	21.4	21.9	20.7

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

² French fry color data from 15 (45°F) trials grown in Idaho, Oregon and Washington. USDA color chart [00 – 4.0(darkest)]

Internal and External Defects:

Alpine Russet has exhibited lower susceptibility to growth cracks and secondary growth than Ranger Russet and Russet Burbank (Table 5), particularly under high stress conditions. Alpine Russet's susceptibility to blackspot bruise is similar to Russet Burbank but less than Ranger Russet. It also is resistant to hollow heart. A susceptibility to net necrosis/vascular discoloration was noted in early harvest trials of the 2002 -2004 Western Regional Potato Variety Trials, but this tuber defect was not observed in full-season trials. With its medium-late maturity, a full growing season is recommended for this variety, and the noted tuber defect is not expected to impact this variety.

Table 5. Internal and external defects of Alpine Russet tubers compared with those of Ranger Russet and Russet Burbank. Data taken are from trials grown in Idaho, Oregon and Washington from 2002-2004.

Defect	Alpine Russet	Ranger Russet	Russet Burbank
Growth cracks ¹	4.6	4.4	3.5
Second growth ¹	4.6	4.5	3.5
Blackspot bruise ¹	4.1	3.5	4.0
Hollow heart/Brown Center ²	0%	0%	7%

¹ Growth cracks, second growth, 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:

Alpine Russet tubers have significantly lower glycoalkaloid and reducing sugar concentrations than those of Ranger Russet or Russet Burbank, but have higher sucrose and protein concentrations (Table 6). Vitamin C concentrations for Alpine Russet are similar to Russet Burbank but lower than Ranger Russet, a variety known for its high Vitamin C concentration.

Table 6. Biochemical composition of Alpine Russet tubers compared with those from Ranger Russet and Russet Burbank. Data was taken from three trials grown in 2002-2004 at Aberdeen, Idaho.

Component	Alpine Russet	Ranger Russet	Russet Burbank
Glycoalkaloids (mg/100g)	2.5	4.1	5.3
Reducing sugars (% FWB)	0.05	0.12	0.11
Sucrose (% FWB)	0.28	0.19	0.16
Protein (%DWB)	5.9	5.4	5.2
Vitamin C (mg/100g)	22.9	31.6	22.0

Storage Characteristics:

Alpine russet has a dormancy length equivalent to Russet Burbank. On average, Alpine Russet has a dormancy length of 185 days at 42°F, 165 days at 45°F, and 140 days at 48°F. Three year averages indicate that Alpine Russet has a slightly higher susceptibility to Fusarium dry rot than Russet Burbank. Mean dry rot decay (severity) in Alpine Russet was 19% compared to 10% for Russet Burbank. Percent incidence (rot >0%) was slightly higher in Alpine Russet, at 67% versus 55% for Russet Burbank. Total percent weight loss in Alpine Russet was not significantly different than Russet Burbank at 42 or 45°F, however at 48 °F, it was significant. On average total weight loss in Alpine Russet was 5.3, 4.6, and 8.0% compared to Russet Burbank weight loss of 4.4, 3.6, and 5.0% at 42, 45 and 48°F respectively.. Glucose concentrations were lower than Russet Burbank across years, temperatures and dates in storage. Peak glucose concentration in Alpine Russet occurred at ~190 days after harvest in 2006-07 at 0.12% (fresh weight). Typically glucose concentrations remained below 0.10 % at 42°F in all three years and near or below 0.05% in the 45 and 48°F storages. Sucrose concentrations were higher in Alpine Russet at all temperatures and years compared to Russet Burbank. Fry color was less than or equal to a USDA 1 when stored at both 45 and 48 °F. At 42°F, fry color was USDA 2 or less, except in 06-07, between 70 and 180 days after harvest when fry color reached a USDA 3. Mottling, a dark, uneven coloration which can occur in fried products, scored at a mild level at 42°F, and mild to none at 45 and 48°F.

Disease Reactions:

Alpine Russet is significantly more resistant to Verticillium wilt than Russet Burbank, and has similar resistance to common scab (Table 7). It has similar susceptibility to foliar and tuber early blight, foliar late blight, dry and soft rot. However, it is slightly less susceptible to tuber late blight infections and PLRV net necrosis.

Table 7. Disease reactions of Alpine Russet tubers compared with those of Russet Burbank.

Disease Responses ¹	Alpine Russet	Russet Burbank
Verticillium Wilt	MR	S
Foliar Early blight	S	S
Tuber Early blight	MS	MS
Late blight (foliar)	S	S
Late blight (tuber)	MS	S
Common Scab	MR	MR
(PLRV) Net necrosis/serious defect	MS	S
Corky ring spot	S	S
Root knot nematode	S	S
Dry rot (<i>F. sam</i>)	S	S
Dry rot (<i>F. sol. var. coer.</i>)	MS	S
<i>Pectobacterium</i> soft rot	S	S
PVX ²	*	VS
PVY ⁰	*	S
PLRV	*	VS

*Visual PVY symptoms are typical (from Kimberly 2008), Virus results for susceptibility/resistance from Kimberly will be available Feb. 2009. Experiments for PVY necrotic strains will be conducted winter 08/spring 09.

#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.”

1 Responses of Alpine 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;

Common scab: Early blight, *Pectobacterium* (*Erwinia*) soft rot, Fusarium dry rot: Aberdeen, ID;

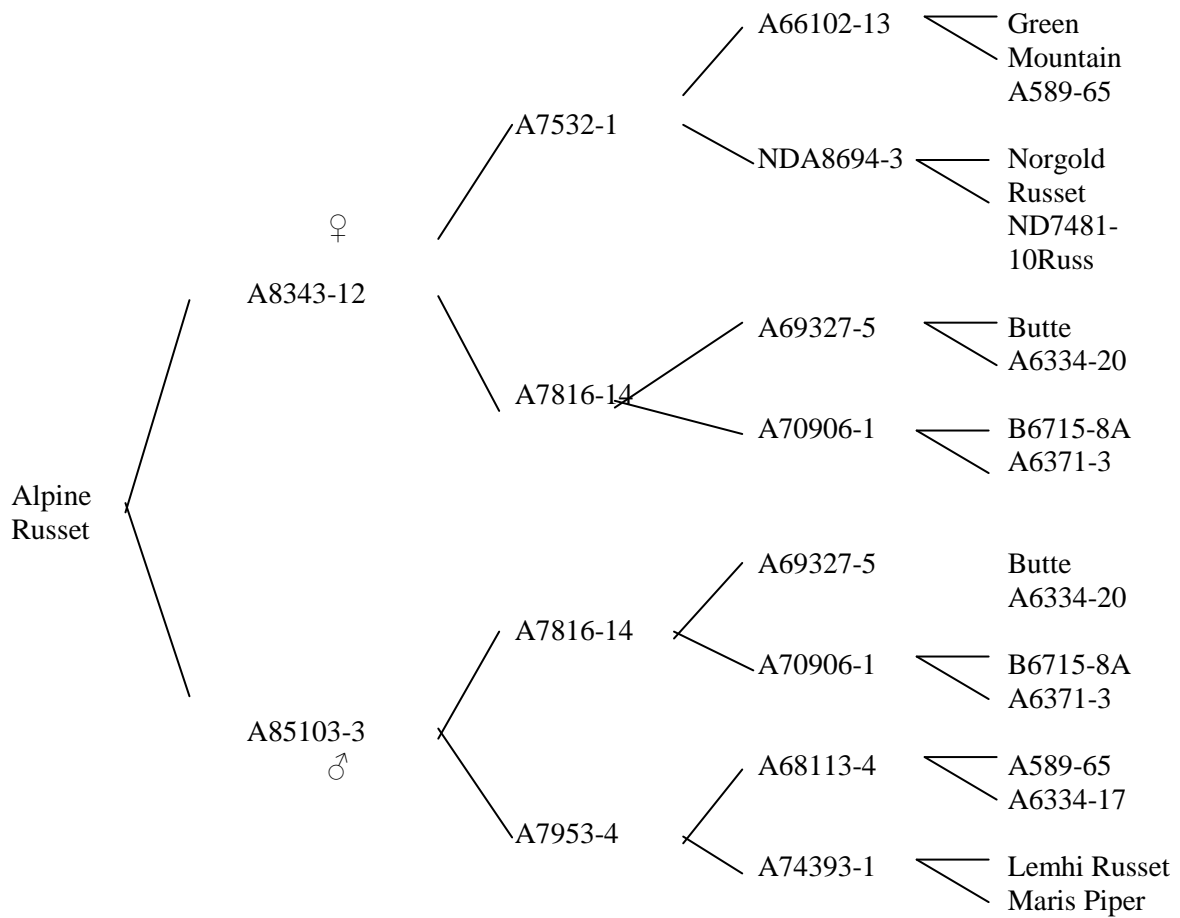
Viruses and PLRV net necrosis: Kimberly, ID, Hermiston, OR;

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.

Figure 1. Pedigree of Alpine Russet



ALPINE RUSSET

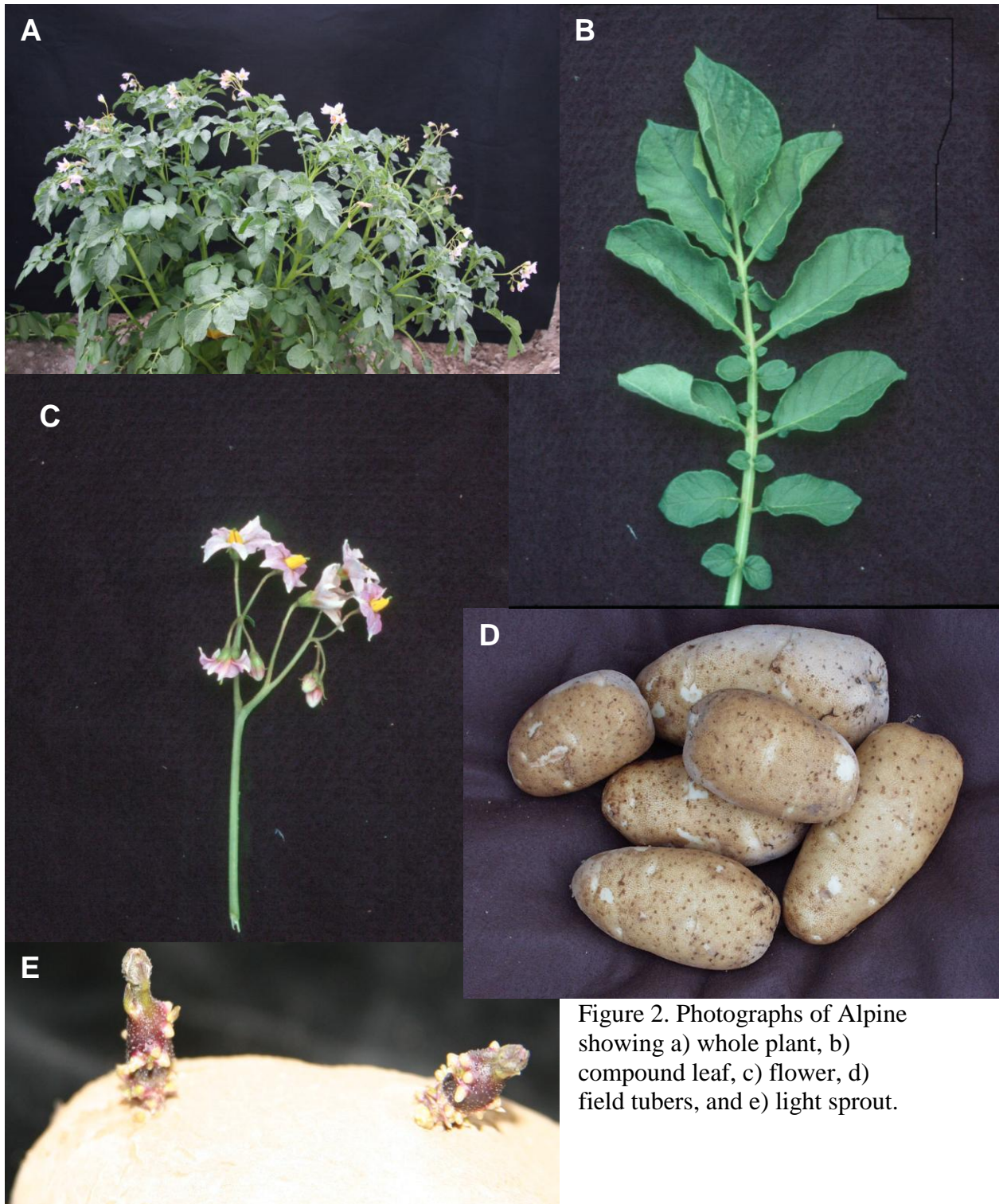


Figure 2. Photographs of Alpine showing a) whole plant, b) compound leaf, c) flower, d) field tubers, and e) light sprout.