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POTATO EYES

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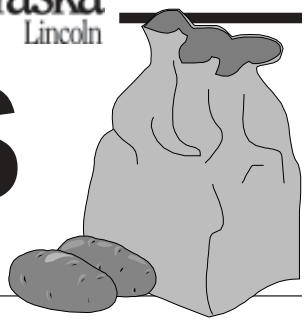

New Colorado Russets: Fremont

The release of Fremont Russet (CO85026-4)) was in 2001 by the Colorado Agricultural Experiment Station. It resulted from a cross made in 1985 by Dr. David Holm in Colorado with one parent being Century Russet. This variety was tested in the Western Regional Trials for three years, 1995-1997, and was in the Nebraska trials for four years from 1998 to 2001 in Chase/Dundy, Holt and Scotts Bluff Counties.

The following summarizes its properties and some of the field data.

Summary of Properties:

Purpose -- fresh market.

Maturity -- medium to late.

Vine -- medium-sized; usually two to three stems per plant; determinate.

Flowers -- white.

Roots -- shallow.

Tuber Color -- dark-medium-brown and heavily-russet skin; white flesh.

Tuber Shape -- oblong to long.

Eyes -- shallow, unevenly distribute mostly at bud end.

Set -- around seven per plant, low to middle of hill.

Yield -- medium, mid-300s cwt/a in the San Luis Valley.

Specific Gravity -- medium, mid-1.080s in Colorado.

Dormancy -- medium about three months.

Emergence -- uniform.

Plant Spacing -- 12 inches recommended, greater increases culls.

Storage -- excellent long-term storage.

Glycoalkaloids -- below average.

Vitamin C -- average.

Cooking Quality -- good.

Sugar -- medium to high, fry dark.

Bruising -- susceptible to black spot and shatter bruising.

External Defects -- can mis-shape with wide plant spacings; enlarged lenticels, growth cracks and alligator hide have been noted occasionally.

Internal Defects -- resistant to hollow heart.

Season Diseases --susceptible to black-leg, bacterial soft rot and seed decay, early blight and late blight (foliar), leaf-roll virus, PVX and PVY; susceptible to ring rot which shows foliar symptoms 90 days after planting; common scab susceptibility is erratic; resistant to Verticillium wilt.

Storage Diseases -- moderately resistant to early blight and silver scurf; susceptible to soft rot and dry rot; reaction to leak, pink rot and black scurf are not known.

Herbicide Sensitivity -- resistant to metribuzin.

Fertilization -- low nitrogen, 140-150 lb/a.

Irrigation -- moderate drought tolerance.

Adaptability -- performs well in rocky soils

Summary of Management Profile:

Planting -- Seed tubers may be cut or whole but should be planted 12 inches apart to maximize yield and grade, and minimize culls due to mis-shape.

Fertility -- Nitrogen = 140-150 lb/a; Phosphorus = 80-190 lb/a; Potassium = up to 100 lb/a. Pre-plant N = 50-70 lb/a. N applications may affect timing of tuber growth by increasing mis-shaping. Remaining N should be fertigated 7 to 10 lb/a each application, not to exceed 20 lb/a in a single dose

Irrigation -- At maximum evapo-transpiration (ET) (2.5 to 3 in/week), irrigation interval is about three days. Over-watering especially late in the season, enlarges lenticels making tubers susceptible to soft rot and leak.

Vine Desiccation -- Average time from planting is 115 to 120 days. Vine death is required usually and skin sets after 14 days.

Conclusions/Comments: Fremont Russet is targeted for the fresh market as a possible replacement for Centennial Russet in the San Luis Valley, CO. In the Nebraska trials, Fremont Russet yields averaged greater than Russet Norkotah at all locations but averaged about the same as the trial averages. It showed the greatest differences in the Scottsbluff trials where it yielded significantly more than the trial averages. Culls resulted primarily from mis-shaped tubers, most notably jelly ends. A tendency to form sugar ends was also observed in the Western Regional Trials. In the Western Trials, it was rated about the same as Russet Norkotah for the fresh market but fries dark for processing. From these trials, it's clear that Fremont Russet's yields are low when harvested early.

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Alexander D. Pavlista

New Colorado Russets: Keystone

Table 1. Performance of Fremont Russet in Nebraska, 10 site-years.
a. Yield Parameters

	Total Yield cwt/a	US#A Yield cwt/a	US#1 Yield cwt/a	Percent US#A
Fremont Russet	403 A	373 A	318	93 A
Russet Norkotah	325 B	283 B	266	86 B
trials ave.	390 A	354 A	322	91 A

b. Tuber Characteristics

	Off-Shape,%	Common Scab,%	Black Scurf,%	Specific Gravity
Fremont Russet	11 A	3	1	1.078 A
Russet Norkotah	4 B	1	1	1.069 C
trials ave.	6 AB	1	2	1.073 B

A,B,C = significantly different from each other at 95% confidence level.

c. by location:

	Panhandle	Southwest	Northeast
	Yield, US grade A, cwt/a		
Fremont Russet	414	375	430
Russet Norkotah	281	334	357
trials ave.	362	371	443
	Panhandle	Southwest	Northeast
	Mis-shaped Tubers, % US grade A		
Fremont Russet	25	2	9
Russet Norkotah	10	2	0
trials ave.	12	4	3

Trial Notes:
1. Maturity for Fremont Russet was full season in the Panhandle.
2. Translucent or jelly ends occasionally were observed.
3. Hollow heart was not observed in Fremont Rus. nor Rus. Norkotah.
4. Early blight sensitivity was less than Russet Norkotah, like Yukon Gold.
5. Fremont Russet was sensitive to desiccation by diquat.

Table 2. Performance of Fremont Russet in the Western Regional Trials, 1995-1997, full season = 27 site-years, short season = 17 site-years

a. Full Season

	Total Yield cwt/ac	US#1 Yield cwt/ac	12oz Yield cwt/ac	Specific Gravity
Fremont Russet	444 AB	381 ab	153 A	1.082 A
Russet Norkotah	396 B	332 a	94 B	1.074 B
trials ave.	509 A	418 b	152 A	1.081 A

b. Short Season

	Total Yield cwt/ac	US#1 Yield cwt/ac	12oz Yield cwt/ac	Specific Gravity
Fremont Russet	303 B	233 B	41 b	1.080 A
Russet Norkotah	332 B	258 AB	46 b	1.071 C
trials ave.	380 A	286 A	74 a	1.077 B

A-C = significantly different from each other at 95% confidence level.
a-b = significantly different from each other at 90% confidence level.

Trial Notes:
1. Maturity for Fremont Russet was medium to late season.
2. Significantly higher jelly ends reported in 1995 and 1996 for Fremont Russet (31%) than for Russet Norkotah (16%) and for trials' averages (12%).
3. Resistance to Verticillium wilt by Fremont Russet reported for each year.
4. Resistance to common scab by Fremont Russet was reported in two years and moderate susceptibility was reported the third year.

CULTIVARS: Keystone Russet

The release of Keystone Russet (AC83064-1) was in 1999 by the Colorado and Idaho Agricultural Experiment Stations, and the USDA-ARS. Keystone Russet and Silverton Russet resulted from the same cross and are siblings. It resulted from a cross made in 1983 in Idaho and developed in Colorado. One parent is CalWhite, a long white cultivar. This variety was tested in the Western Regional Trials for three years, 1993-1995, and was in the Nebraska trials for four years from 1998 to 2000 in Chase/ Dundy, Holt and Scotts Bluff Counties.

The following summarizes its properties and some of the field data.

Summary of Properties:
Purpose -- fresh market.
Maturity -- medium to late (may be similar to Rus. Burbank in some locales).
Vine -- medium-large; semi-erect or somewhat spreading; determinate.
Flowers -- white.
Roots -- moderate to shallow system.
Tuber Color -- smooth, medium russet skin; white flesh.
Tuber Shape -- oblong to long, somewhat flattened.
Eyes -- shallow; distributed heavily toward the bud end.
Set -- around seven tubers, middle of hill.
Yield -- high.
Specific Gravity -- low to medium (upper 1.070s), similar to Russet Norkotah.
Dormancy -- short.
Emergence -- fairly uniform.
Plant Spacing -- 10 to 12 inches.
Storage -- stores well with few internal defects; bruising must be low due to tuber susceptibility to early blight.
Glycoalkaloids -- low.
Vitamin C -- average.
Cooking Quality -- fries dark.
Sugar -- high.
Bruising -- susceptible to blackspot bruising, similar to Russet Norkotah; can skin easily without full maturity.
External Defects -- heat sprouting occurs under high temperature.
Internal Defects -- lower hollow heart.
Season Diseases -- susceptible to early and late blights on both foliage and tubers, black leg, seed-piece decay, soft rot, ring rot, leaf roll, and PVX and PVY; resistant to Verticillium wilt and common scab.
Storage Diseases -- susceptible to soft rot, dry rot and black scurf; moderately resistant to net necrosis.
Herbicide Sensitivity -- susceptible to metribuzin injury.
Fertilization -- low fertility needs especially nitrogen.
Irrigation -- moderate drought tolerance.
Adaptability -- does not perform as well on alkaline soils.

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New Colorado Russets: Silverton

Summary of Management Profile:
Planting -- Whole or cut seed-pieces are acceptable; note eye distribution. Space pieces 10 to 12 inches apart and plant about 5 to 5.5 inches deep.
Fertility -- Nitrogen = 120-140 lb/a; Phosphorus = 80-190 lb/a; Potassium = up to 100 lb/a (San Luis Valley recommendations). Pre-plant N should be 60 to 80 lb/a and the remainder given at seven to 10 lb/a per week. N does not affect timing of tuberization.
Irrigation -- Interval at maximum evapotranspiration (ET) is three days.
Pest Control -- Competes well with weeds. Has a high aphid preference and susceptibility to aphid-borne viruses. Fungicide application against early blight probably will be needed. Is more susceptible to late blight than many russets.
Vine Desiccation -- Average time from planting to vine desiccation is 115 to 120 days; skin set takes 21 to 28 days after desiccation. Skin sets poorly if nitrogen is too high toward the end of the season.

Conclusions/Comments: Keystone Russet is targeted for the fresh market with the same market window as Russet Norkotah. In the Nebraska trials, Keystone Russet yields tended to average greater than Russet Norkotah in the Northeast and at Scottsbluff, and the same in the Southwest. It yielded about the same as the trials' averages. Culls were mostly due to black scurf. In the Western Regional Trials, Keystone Russet significantly out-yielded Russet Norkotah and the trials' averages. Higher yields occurred in both early and late harvest trials. A tendency to form sugar ends was observed in the Western Regional Trials. In the Western Trials, it was rated better than Russet Norkotah for the fresh market but fries dark for processing. Keystone Russet is versatile to be harvested early and late, and compete with Russet Norkotah in both temporal markets.

CULTIVARS: Silverton Russet

The release of Silverton Russet (AC83064-4) was in 1999 by the Colorado and Idaho Agricultural Experiment Stations, and USDA-ARS. Silverton Russet and Keystone Russet resulted from the same cross and are siblings. It resulted from a cross made in 1983 in Idaho and developed in Colorado. One parent is CalWhite, a long white cultivar. This variety was tested in the Western Regional Trials for three years, 1993-1995, and was in the Nebraska trials for four years from 1998 to 2000 in Chase/ Dundy, Holt and Scotts Bluff Counties.

The following summarizes its properties and some of the field data.

Summary of Properties:
Purpose -- fresh and process markets.
Maturity -- medium to late, similar to Russet Burbank.
Vine -- medium to large, larger than Keystone Russet; upright; determinate.
Flowers -- white.
Roots -- moderate to shallow root system.
Tuber Color -- medium golden-brown russet skin with smooth and fine net; white flesh.
Tuber Shape -- oblong to long.
Eyes -- shallow; distributed heavily toward the bud end.
Set -- around eight, middle of hill.
Yield -- medium to high; high percentage of marketable yield.
Specific Gravity -- low to medium; marginal for processing.
Dormancy -- short to medium.
Emergence -- rapid.
Plant Spacing --
Storage -- stores well with few internal defects; bruising must be low due to tuber susceptibility to early blight.
Glycoalkaloids -- low, higher than Keystone Russet.
Vitamin C -- average.
Cooking Quality -- dual purpose; fries average.
Sugar -- average.
Bruising -- resistant to black spot; can skin easily without full maturity.
External Defects -- heat runners form under high temperatures in mid season.
Internal Defects -- none reported.
Season
Diseases -- susceptible to early and late blights, Verticillium wilt, black leg, seed decay, leaf roll, ring rot, and PVX, and very susceptible to PVY; resistant to common scab.

Storage Diseases -- susceptible to soft rot, tuber early blight, dry rot, and black scurf.
Herbicide Sensitivity -- moderately sensitive to metribuzin injury.
Fertilization -- slightly less than Rus. Norkotah, more than Keystone Russet.
Irrigation -- moderate drought tolerance.

Summary of Management Profile:
Planting -- Whole or cut seed-pieces are acceptable; note eye distribution. Space pieces 10 to 12 inches apart and plant about four inches deep.
Fertility --
Nitrogen = 180-200 lb/a; Phosphorus = 120-200 lb/a; Potassium = up to 100 lb/a (San Luis Valley recommendations). Pre-plant N should be 90 to 100 lb/a and the remainder given at seven to 10 lb/a per week. N does not affect timing of tuberization.
Irrigation -- Interval at maximum evapotranspiration (ET) is 2.5 to 3 days.
Pest Control -- Competes well with weeds. Has a high aphid preference and susceptibility to aphid-borne viruses. Is slightly more susceptible to early blight that most russets.
Vine Desiccation -- Average time from planting to vine desiccation is 115 to 120 days; skin set takes 21 days after desiccation. Skin sets poorly if nitrogen is too high toward the end of the season.

Conclusions/Comments: Silverton Russet has a dual purpose market but works more consistently for the fresh market. Its fresh market window would be to compete with Russet Norkotah in full season production. At Scottsbluff, it yielded better than Keystone Russet and Russet Norkotah, but in the Northeast and Southwest sites of the Nebraska trials, it yielded slightly less than these two other fresh market russets. Silverton Russet had less black scurf than Keystone Russet and tended to be the lowest. In the Western Regional Trials, Silverton Russet significantly yielded less than Keystone Russet after

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both short and full season harvests. In full season harvest trials, it significantly yielded greater than Russet Norkotah and about the same after short season harvest. In short and full season trials, Silverton Russet's yields were similar to the trials' averages. The occurrence of hollow heart and sugar ends was average. In these trials, researchers rated Silverton slightly higher than Russet Norkotah but slightly lower than Keystone Russet for fresh market usage. Silverton Russet is sufficiently versatile to be harvested early and late, and compete with Russet Norkotah in both temporal markets.

Table 3. Performance of Keystone Russet and Silverton Russet in Nebraska, 7 site-years.

a. Yield Parameters

	Total Yield cwt/a	US#A Yield cwt/a	US#1 Yield cwt/a	Percent US grade A
Keystone Russet	397	360	324	90
Silverton Russet	366	341	322	92
Russet Norkotah	361	329	302	92
trials ave.	395	364	328	92

b. Tuber Characteristics

	Off-Shape,%	Common Scab,%	Black Scurf,%	Specific Gravity
Keystone Russet	4	1	5.0 A	1.068 B
Silverton Russet	4	0	1.1 B	1.068 B
Russet Norkotah	5	1	2.9 AB	1.068 B
trials ave.	6	1	2.6 AB	1.073 A

A,B = significantly different from each other at 95% confidence level.

c. by location:

	Panhandle	Southwest	Northeast
	Yield, US grade A, cwt/a		
Keystone Russet	411 ab	303	382 a
Silverton Russet	479 b	263	328 b
Russet Norkotah	305 a	332	349 ab
trials ave.	380 ab	342	374 ab

	Panhandle	Southwest	Northeast
	Mis-shaped Tubers, % US grade A		
Keystone Russet	1	5	4
Silverton Russet	9	1	3
Russet Norkotah	14	2	1
trials ave.	12	4	4

a,b = significantly different from each other at 90% confidence level.

Trial Notes:
1. Maturities for Keystone Russet and Silverton Russet were late similar to Ranger Russet and Russet Burbank.
2. Mis-shaping of tubers from both russets was less at Scottsbluff than with Russet Norkotah and trial average.
3. Early blight sensitivity of both russets varied between years.
4. Vine desiccation of both was difficult, similar to Ranger Russet.
5. Keystone Russet had a very large vine while Silverton Russet's vine was medium. Both had average early vigor at 10 days after emergence.

Table 4. Performance of Keystone Russet and Silverton Russet in the Western Regional Trials, 1993-1995, full season = 26 site-years, short season = 17 site-years.

a. Full Season

	Total Yield cwt/ac	US#1 Yield cwt/ac	12oz Yield cwt/ac	Specific Gravity
Keystone Russet	603 A	533 A	212 A	1.077 B
Silverton Russet	504 B	452 B	194 AB	1.078 B
Russet Norkotah	388 C	320 C	87 C	1.076 B
trials ave.	533 B	451 B	159 B	1.082 A

b. Short Season

	Total Yield cwt/ac	US#1 Yield cwt/ac	12oz Yield cwt/ac	Specific Gravity
Keystone Russet	438 A	353 A	69 A	1.069 B
Silverton Russet	338 B	272 B	53 AB	1.074 AB
Russet Norkotah	321 B	266 B	36 B	1.073 AB
trials ave.	361 B	270 B	55 AB	1.076 A

A-C = significantly different from each other at 95% confidence level.

Trial Notes:
Keystone Russet --
1. Maturity for Keystone Russet was medium to late season.
2. Although having an higher incidence of sugar ends (28%), it was not significantly greater than Russet Norkotah (14%) or trials' averages (16%).
3. Incidence of hollow heart was significantly lower (1%) than Russet Norkotah (5%) and trials' averages (4%).
4. Resistance to common scab and Verticillium wilt was reported for each year.
5. Susceptibility to early blight and soft rot was reported for each year.
6. Slight susceptibility to shatter bruise and internal black spot was observed but was not consistent between years.
7. Fresh market merit rating of Keystone Russet was significantly better than Russet Norkotah and trials' averages.

Silverton Russet --
1. Maturity for Silverton Russet was medium to late season.
2. Sugar ends (16%) and hollow heart (6%) were similar to Russet Norkotah and the trials' averages.
3. Resistance to common scab was reported for each year.
4. Susceptibility to early blight and soft rot was reported for each year, but, for Verticillium wilt susceptibility was reported in 1993 and 1994, and resistance in 1995.
5. Slight susceptibility to shatter bruise was observed.
6. Fresh market merit rating of Silverton Russet was slightly higher than Russet Norkotah and trials' averages, and slightly lower than Keystone Russet.

Acknowledgments: Characteristics and profile obtained from Drs. Dave Holm, Rob Davidson and Susie Thompson from their work in the San Luis Valley, CO. Photographs were obtained from Colorado State University's web-sites.