RANGER RUSSET: A LONG RUSSET POTATO VARIETY FOR PROCESSING AND FRESH MARKET WITH IMPROVED QUALITY, DISEASE RESISTANCE, AND YIELD

J.J. Pavek[2], D.L. Corsini[2], S.L. Love[2], D.C. Hane[3], D.G. Holm[4], W.M. Iritani[5], S.R. James[6], M.W. Martin[7], A.R. Mosley[8], J.C. Ojala[9], C.E. Stanger[10], and R.E. Thornton[5]

Abstract

Ranger Russet, a new full-season potato variety, was jointly released to growers by the U.S. Department of Agriculture and the Agricultural Experiment Stations of Idaho, Oregon, Washington, and Colorado on May 14, 1991. Ranger Russet was tested in irrigated performance trials in the Western U.S. since 1979. It produces a large yield of high quality, long, russet-skinned tubers that are well suited for baking and processing into french fries. Ranger Russet is more resistant than Russet Burbank to Verticillium wilt, viruses X and Y, leafroll net necrosis, and Fusarium dry rot. It is highly resistant to hollow heart.

Compendio

Ranger Russet, una nueva variedad de papa para la temporada principal, fue entregada conjuntamente a los productores por el Departamento de Agricultura de los Estados Unidos y las Estaciones Experimentales Agrícolas de Idaho, Oregón, Washington y Colorado el 14 de mayo de 1991. Ranger Russet fue probada en ensayos de comportamiento bajo irrigación en el oeste de los Estados Unidos desde 1979. Rinde abundantes tubérculos alargados y rojizos de gran calidad que son apropiados para el horneado

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[2]Research Geneticist and Research Plant Pathologist, ARS, USDA, and Horticulturist, respectively, University of Idaho R & E Center, Aberdeen, ID 83210.

[3]Agronomist, Hermiston Agricultural R & E Center, Hermiston, OR 97838.

[4]Research Horticulturist, Colorado State University, San Luis Valley Station, Center, CO 81125.

[5]Emeritus Scientist and Extension Horticulturist, respectively, Washington State University, Pullman, WA 99164-6414.

[6]Agronomist, Central Oregon Experiment Station, Redmond, OR 97756.

[7]Research Geneticist, ARS, USDA, IAREC, Prosser, WA 99350-9687.

[8]Extension Research Agronomist, Oregon State University, Corvallis, OR 97331-3002.

[9]Extension Agronomist, University of Idaho, Idaho Falls, ID 83402.

[10]Agronomist, Malheur Experiment Station, Ontario, OR 97914.

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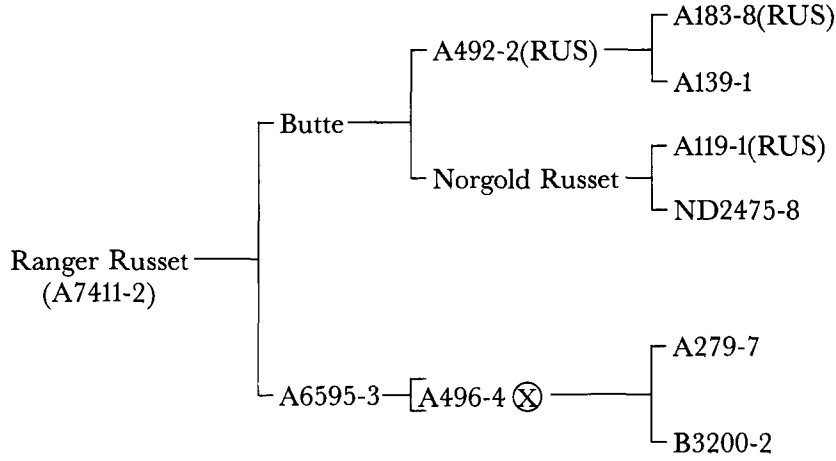
y su procesamiento como papas fritas a la francesa. Ranger Russet es más resistente que Russet Burbank a la marchitez por *Verticillium*, a los virus X y Y, a la necrosis en red del virus del enrollamiento de la hoja y a la pudrición seca por *Fusarium*. Es muy resistente al corazón vacío.

Introduction

Russet Burbank is grown on over 75% of the potato acreage in the Western U.S. (2). But growers and processors continue to experience serious losses due to its susceptibility to diseases, such as Verticillium wilt, leafroll, and net necrosis, and to heat and moisture stresses, which often result in tuber malformation and internal defects such as hollow heart, heat necrosis, and sugar ends. Although resistance to various pathogens and to environmental stresses has been available in parental stocks for some time, it was necessary to combine these characteristics in a clone with long, russet-skinned tubers and the high internal quality needed for processing and fresh use. Ranger Russet is a result of these efforts.

Ranger Russet was first selected at Aberdeen, Idaho in 1977 as A7411-2. It has been tested annually in replicated performance trials since 1979 and in commercial processing trials since 1987. Its tubers are similar to those of Russet Burbank which is in the pedigree of two of its great-grandparents (A183-8 and A119-1). The pedigree for Ranger Russet is:



Description

Plants—Large, upright to spreading, medium late. *Stems:* Medium thick, green but with light brownish, red-purple pigment in full sun; wings slightly to moderately prominent, up to 2 mm, straight to moderately wavy; nodes not prominent. *Leaves:* Large, broad, medium green, leaflets moder-

ately open to close. *Terminal leaflets:* Obovate to oval, abruptly acuminate tip, oblique to rounded base; mean blade length (100 leaves) 65 ± 6 mm, mean width 37 ± 4 mm, index 57. *Primary lateral leaflets:* Ovate with obtusely pointed to acuminate tip and irregular base, three to four pairs; mean blade length 61 ± 6 mm, mean width 35 ± 3 mm, index 57. *Secondary leaflets:* three to four pairs. *Tertiary leaflets:* Up to three pairs. *Midrib and petioles:* Light green, may be reddish purple on upper side of midrib, some pigment extends into leaflets, sparse pubescence more dense and shorter on upper midrib. *(Pseudo)Stipules:* Medium size, often moderately clasping, may be large and leaf-like if auxiliary shoot is present.

Flowers—Abundant. *Buds:* Green with reddish-purple base and pedicel, moderate amount of short pubescence. *Calyx lobes:* Awl-shaped, 3 mm long. *Corolla:* Medium large, up to 35 mm, red-purple color. *Anthers:* Bright yellow. *Pollen:* Moderate amount, fertile.

Tubers (Fig. 1)—Long, slightly flattened, tuber appearance similar to Russet Burbank; mean length (100 tubers 200-250 g) 115 ± 11 mm, mean width 60 ± 4 mm, mean thickness 51 ± 4 mm; indices, width to length 53, thickness to length 46, thickness to width 87. *Skin:* Tannish-brown, medium russet with medium pattern, not scaly. *Eyes:* Moderately shallow to deep, high number, well distributed. *Eyebrows:* Slightly prominent with deeper eye. *Flesh:* White. *Sprout* (in light): Globose to elongate, fairly large leafy tip, light red-purple to green, lightly pubescent but leafy parts moderately hairy, moderate development rate. *Dormancy:* Medium.

FIG. 1. Tubers of Ranger Russet grown in silt loam at Aberdeen, Idaho.

Characteristics

Ranger Russet has been tested in replicated trials in Idaho since 1979 and in neighboring states since 1981. During 1984-86 it was tested at eleven locations in seven states in the uniform Western Regional Potato Variety Trial. Commercial testing for french fry processing has been conducted since 1987. Yield trial results for the four states joining in the release are shown in Table 1.

Ranger Russet consistently produced higher U.S. No. 1 yields than Russet Burbank at all locations and usually produced more total yield. In addition, Ranger Russet tubers were consistently higher in specific gravity/solids. More rapid development of solids makes Ranger Russet ready for processing about two weeks earlier than Russet Burbank, which is important in the longer growing season areas of the West. Its maturity characteristics are otherwise similar to those of Russet Burbank.

Ranger Russet is superior to Russet Burbank in other aspects of internal and external quality and, to some extent, in disease resistance (Table 2). Along with higher solids, Ranger Russet's tubers are lower in reducing sugars at harvest and throughout the storage season, which results in lighter french fry color out of the field and out of storage. It consistently has had less french fries with dark or sugar ends. Two other important attributes of Ranger Russet are freedom from hollow heart and much less internal brownspot (heat necrosis). Both are serious problems of Russet Burbank in the Columbia Basin. Ranger Russet averaged 65% higher vitamin C content than Russet Burbank, while its total glycoalkaloid level has been similar to that of Russet Burbank.

TABLE 1.—*Mean tuber yields and specific gravities (S.G.) for Ranger Russet and Russet Burbank.*

		RANGER RUSSET			RUSSET BURBANK		
	Loc-	Yield: Cwt/A (T/HA)			Yield: Cwt/A (T/HA)		
Location[1]	yrs.	Total	US No.1	S.G.	Total	US No.1	S.G.
Idaho	32	439 (49)	338 (38)	1.091	404 (45)	255 (28)	1.082
Colorado	3	371 (41)	323 (36)	1.095	336 (37)	208 (23)	1.091
Oregon	5	576 (64)	455 (50)	1.093	557 (62)	368 (41)	1.082
Washington	4	589 (66)	465 (52)	1.078	604 (67)	405 (45)	1.074
Mean		494 (55)	395 (44)	1.089	475 (53)	309 (34)	1.082

[1]IDAHO: Aberdeen and Kimberly 23 trials (1981-90); Parma 1988-90; Rexburg 1986, 87, 89;
Shelley 1985, 86, 88-90.
COLORADO: Center 1984-86.
OREGON: Hermiston, 4 trials (1984-86); Malheur, 1985-86.
WASHINGTON: Prosser, 1984-85; Othello 1985-86.

TABLE 2.—*Internal quality, grade, disease, and other factors: Ranger Russet and Russet Burbank.*

	Ranger Russet	Russet Burbank
Internal Quality		
Solids (oven dry - %)[1]	23.9	21.6
Reducing sugars (DWB - %)[1]	0.7	1.0
Vitamin C (FWB - mg/100g)[1]	27.9	16.9
Total glycoalkaloids (FWB - mg/100g)[1]	5.2	5.8
French fry color - 45°F[2]	1.6	2.0
French fry color - 40°F[2]	2.7	3.1
French fry - Sugar ends	MR[5]	S
Grade Factors[3]		
Growth crack	MR	MS
Second growth	MR	S
Hollow heart	HR	MS
Shatter bruise	MS	MR
Internal blackspot	S	S
Internal necrosis (IBS)	MR	MS
Dormancy	M	L
Disease/Pest Reaction[4]		
Verticillium wilt	MR/MS	S/MS
Early blight - foliage	MS	MS
Early blight - tuber*	MR	MR
Late blight*	S	S
Common scab	S	R
Fusarium dry rot*	MR	S
Blackleg*	MS	MS
Leafroll virus	S	S
Leafroll - net necrosis*	MR	S
Virus X	HR	S
Virus Y	R/MR	S/MR
Columbia Rootknot Nematode	-/VS	-/VS
Other		
Metribuzin[4]	R	R
Tuber No. per pl.	5.5	6.2
Tuber weight (oz/g)	7.0/197	6.1/172

[1]Means from Aberdeen, Idaho yield trial samples after 8 weeks storage at 50 F (10 C) 1981-1989. DWB = Dry weight basis. FWB = Fresh weight basis.
[2]USDA Color Chart: 00 (Very light) to 4.0 (dark); from 45 F (7 C) or 40 F (5 C) storage-fried in January or February, 1981-90, Aberdeen samples only.
[3]Idaho yield trials, 1981-90 and Western Regional Trial, 1984-86.
[4]Disease trial results: Aberdeen 1984-89; Prosser rating after /(slash) if different from Aberdeen - Vert. wilt 1980, 82-90; PVY 1982-84, 86, 89-90; Columbia Nematode 1986, 88-90, * Aberdeen only, not scored at Prosser; metribuzin-Aberdeen 1986-89.
[5]S = susceptible, R = resistant, M = moderately (or medium dormancy), V = very, H = highly, L = long.

Ranger Russet is somewhat more susceptible to blackspot bruise than Russet Burbank. (In 11 Idaho trials over seven years it scored 3.2 vs 2.4 for Russet Burbank, where 1.0 = none to 5.0 = maximum.) This can be an important problem, especially when harvesting in hot weather (1). Ranger Russet averaged less tubers per plant and the tubers were slightly larger in size (7.0 vs 6.1 oz) at Aberdeen than Russet Burbank. Under some conditions of stress, its tubers can get quite rough and misshapen but second growth has not been a problem. In the longer growing season areas of western Idaho, Oregon, and Washington, the tubers may become larger than desired for processing or fresh use.

Ranger Russet is superior to Russet Burbank in resistance to certain important fungal and viral pathogens, but it is susceptible to common scab (Table 2). Although there has not been a scab problem with Ranger Russet in commercial fields, caution should be observed when planting in fields with a history of scab. Ranger Russet plants have shown typical ring rot symptoms after controlled inoculations by Idaho Crop Improvement Association.

Taste panel results from Idaho, Washington, and the Red River Valley Research Laboratory (E. Grand Forks, MN) showed that Ranger Russet compared favorably with Russet Burbank in color, texture, and flavor of baked potatoes, french fries, and reconstituted flakes.

Acknowledgments

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