Umatilla Russet: A Full Season Long Russet for Processing and Fresh Market Use[1]

A. R. Mosley[2], S. R. James[3], D. C. Hane[4], K. A. Rykbost[5]*, C. C. Shock[6], B. A. Charlton[5], J. J. Pavek[7], S. L. Love[8], D. L. Corsini[7], and R. E. Thornton[9]

[1]Approved for publication by Oregon State University Agricultural Communications as Technical Paper No. 11512.
[2]Extension Potato Specialist, Department of Crop and Soil Science, Oregon State University, Corvallis, OR 97331.
[3]Senior Research Assistant, Central Oregon Agricultural Research Center, Oregon State University, Madras, OR 97741.
[4]Instructor, Hermiston Agricultural R & E Center, Oregon State University, Hermiston, OR 97838.
[5]Superintendent/Professor, corresponding author, and Faculty Research Assistant, respectively, Klamath Experiment Station, Oregon State University, 6941 Washburn Way, Klamath Falls, OR 97603.
[6]Superintendent/Professor, Malheur Experiment Station, Oregon State University, Ontario, OR 97914.
[7]Research Geneticist, and Research Plant Pathologist, respectively, ARS, USDA, University of Idaho, Aberdeen R & E Center, Aberdeen, ID 83210.
[8]Associate Professor, University of Idaho, Aberdeen R & E Center, Aberdeen, ID 83210.
[9]Extension Horticulturist, Washington State University, Pullman, WA 99164-6414.

ABSTRACT

Umatilla Russet, a moderately late maturing variety especially suitable for frozen French fry processing but also acceptable for tablestock use (boiling, and baking), was jointly released by the Agricultural Experiment Stations of Oregon, Idaho, and Washington and the U.S. Department of Agriculture in 1998. Umatilla Russet was evaluated in irrigated trials in Oregon from 1988 to 1997, and in western regional trials from 1989 to 1991. Total yields were similar to those of Russet Burbank, but Umatilla Russet produced higher marketable yields. In three years of regional trials at up to 13 locations in seven western states, Umatilla Russet averaged 40.5 Mg/ha compared with 32.4 Mg/ha for Russet Burbank. Umatilla Russet fry color and specific gravity are consistently equal to or better than for Russet Burbank. Umatilla Russet is less susceptible to *Verticillium* wilt than Russet Norkotah, less susceptible to net necrosis than Russet Burbank, and resistant to PVX. It is susceptible to PLRV and expresses foliar symptoms of PVY more clearly than Russet Norkotah. Umatilla Russet is less susceptible to tuber infection and decay caused by *Phytophthora infestans* than Ranger Russet and Russet Norkotah. Umatilla Russet is less susceptible to hollow heart, brown center, growth cracks, and sugar ends, but more susceptible to blackspot and shatter bruise than Russet Burbank.

Accepted for publication August 8, 1999.
ADDITIONAL KEY WORDS: *Solanum tuberosum*, variety.

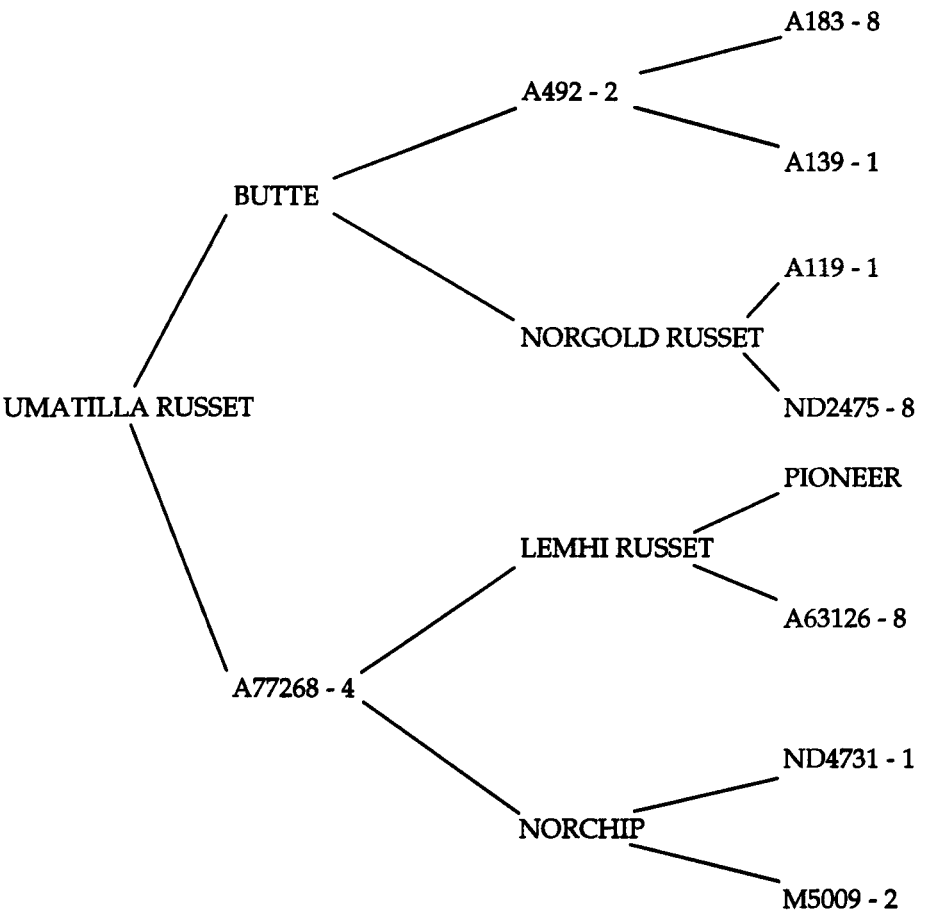
BACKGROUND

Umatilla Russet was evaluated as AO82611-7. The clone originated from a cross made in 1982 between Butte (Pavek *et al.*, 1978) and A77268-4 by J.J. Pavek at the University of Idaho Research Center, Aberdeen, Idaho. AO82611-7 was initially selected at Powell Butte, Oregon in 1984 and increased for three years during preliminary evaluations. From 1987 through 1997, Umatilla Russet was included in replicated Oregon statewide trials at Powell Butte, Hermiston, Klamath Falls, and Ontario. It was included in 1988 Tri-State trials at one location each in Oregon, Washington, and Idaho. Umatilla Russet was evaluated at up to 13 locations in 7 western states in formal regional trials from 1989 through 1991.

The pedigree of Umatilla Russet follows (upper parent is female):

DESCRIPTION

Plants: *Growth habit:* Medium height, semi-erect, compact. *Stems:* No anthocyanin pigmentation, weak to medium wings. *Leaves:* Dark green; medium pubescence; mostly



open silhouette; weak anthocyanin pigmentation in leaf midribs and petioles. *Terminal leaflets:* Narrowly ovate with acuminate tip and obtuse base. *Primary leaflets:* Five pairs per leaf; narrowly ovate with acuminate tip and cordate base. *Secondary leaflets:* Medium frequency. *Tertiary leaflets:* Few in number. Vine maturity is late, similar to Russet Burbank in Oregon.

Inflorescence: Few (7) flowers per plant. *Corolla:* Purple-violet on inner surface, blue-violet on outer surface, pentagonal shape. *Calyx:* No anthocyanin pigment. *Anthers:* Yellow-orange; narrow cone; some pollen shed. *Stigma:* Capitate; green. Low berry production.

Tubers: Skin is tan colored and russetted, tubers are long with a tendency for tapered apical ends. The Umatilla Russet length/width/thickness ratio from an 18 kg sample was 12.2/6.2/5.4 compared with 11.2/6.2/5.3 for Russet Burbank. Eyes are shallow with less than 20 eyes per tuber, fairly well distributed but slightly denser toward the apical end. Eye brows are not prominent. Tuber flesh is slightly creamy. Dormancy at 7 C is two to three weeks shorter than for Russet Burbank.

Light Sprouts: Spherical; heavy pubescence; green base with weak red-violet pigment. Closed tip; medium pubescence; weakly colored; medium to high number of root initials.

See Figure 1 for photographs of Umatilla Russet plant, flower, and tuber.

CHARACTERISTICS

Umatilla Russet produces a high percentage of marketable tubers with excellent quality for frozen French fry processing. In 38 Oregon statewide trials over 10 years, Umatilla Russet marketable yield averaged 21 percent higher than for Russet Burbank and Russet Norkotah (Table 1). Umatilla Russet specific gravity averaged 1.084 vs 1.081 and 1.070 for Russet Burbank and Russet Norkotah, respectively. Umatilla Russet was evaluated in 10 early-harvest and

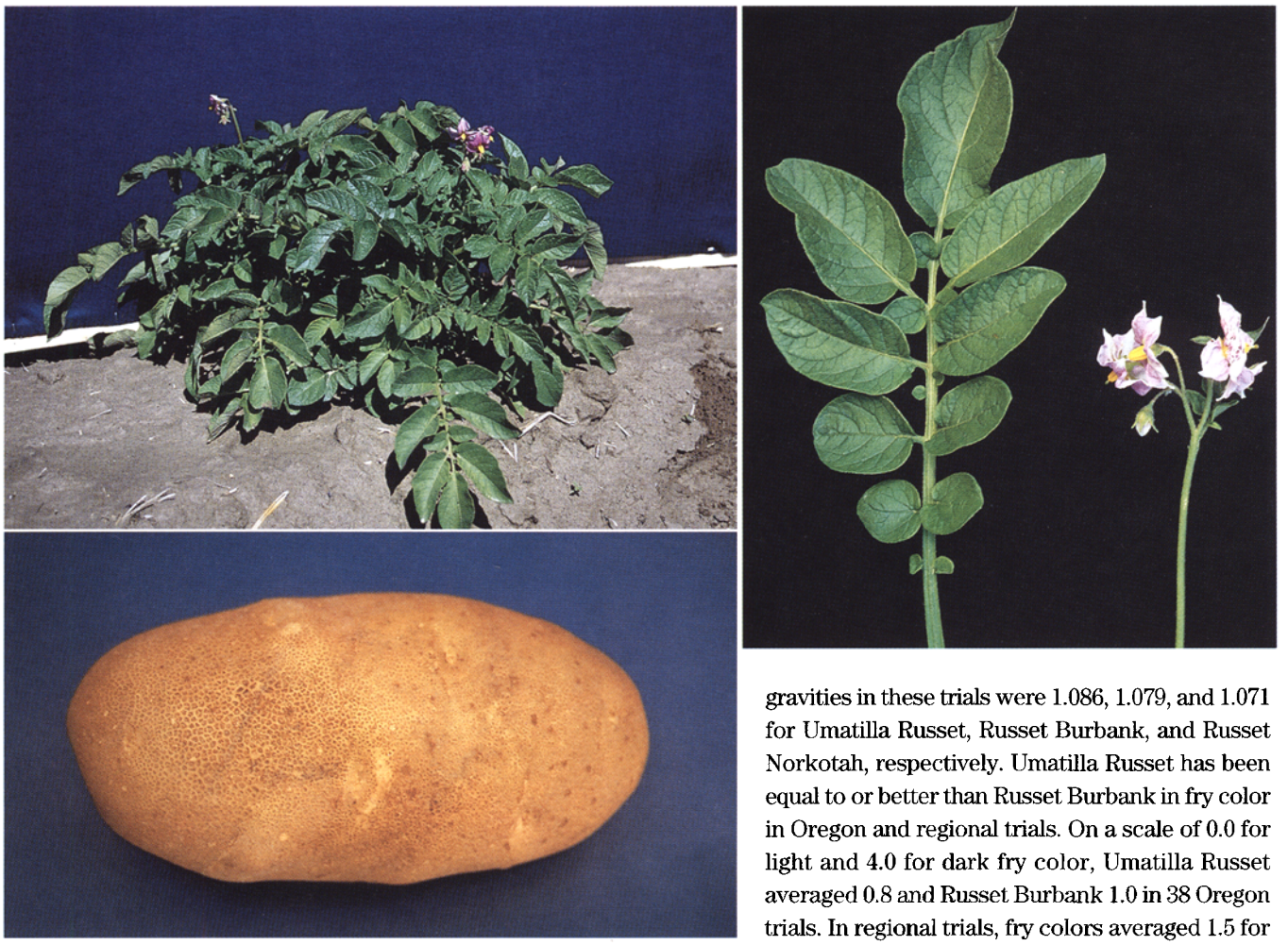


FIGURE 1.
Plant, flower, and tuber characteristics of Umatilla Russet.

24 late-harvest western regional trials in 7 states from 1989 to 1991. Averaged over all regional trials, Umatilla Russet marketable yields were 125 percent of Russet Burbank and 132 percent of Russet Norkotah (Table 2). Mean specific gravities in these trials were 1.086, 1.079, and 1.071 for Umatilla Russet, Russet Burbank, and Russet Norkotah, respectively. Umatilla Russet has been equal to or better than Russet Burbank in fry color in Oregon and regional trials. On a scale of 0.0 for light and 4.0 for dark fry color, Umatilla Russet averaged 0.8 and Russet Burbank 1.0 in 38 Oregon trials. In regional trials, fry colors averaged 1.5 for Umatilla Russet and 1.7 for Russet Burbank after storage for three months at 7 C, and 2.7 for Umatilla Russet and 3.7 for Russet Burbank after three months of storage at 4.5 C.

In three years at Aberdeen, Idaho, Umatilla Russet total glycoalkaloids averaged 1.1 mg/100 g fresh weight, Russet Burbank averaged 3.6 mg/100 g, and Russet Norkotah aver-

TABLE 1.—*Performance of Umatilla Russet (UR), Russet Burbank (RB), and Russet Norkotah (RN) at four Oregon locations between 1988 and 1997.*

Location	Number of years	Total Yield (Mg/ha)			Mkt. Yield (Mg/ha)			Specific Gravity		
		UR	RB	RN	UR	RB	RN	UR	RB	RN
Powell Butte	10	50.7	46.7	40.6	38.7	31.3	33.5	1.082	1.084	1.074
Klamath Falls	10	52.6	54.1	45.2	42.1	36.4	38.2	1.087	1.084	1.069
Hermiston	8	71.5	72.9	49.2	55.2	45.8	39.2	1.079	1.076	1.066
Ontario	10	60.3	60.2	48.0	46.9	37.4	38.0	1.087	1.079	1.071
Overall Mean		58.1	57.7	45.6	45.2	37.3	37.1	1.084	1.081	1.070

TABLE 2.—*Performance of Umatilla Russet (UR), Russet Burbank (RB), and Russet Norkotah (RN) in western regional trials in 1989, 1990, and 1991.*

	Total Yield (Mg/ha)			Mkt. Yield (Mg/ha)			Specific Gravity		
Year	UR	RB	RN	UR	RB	RN	UR	RB	RN
1989	52.4	53.3	–	39.5	32.9	–	1.084	1.081	–
1990	60.1	54.8	43.2	42.4	31.1	32.5	1.087	1.076	1.067
1991	52.9	51.9	36.4	39.8	32.9	28.8	1.087	1.080	1.074
Overall Mean	55.1	53.3	39.9	40.5	32.4	30.7	1.086	1.079	1.071

TABLE 3.—*Disease reactions for Umatilla Russet, Russet Burbank, and Russet Norkotah in western regional trials.*

Disease	Umatilla Russet	Russet Burbank	Russet Norkotah
Vert. Wilt	MS - MR[1]	S - MS	VS
Early blight (foliar)	S - MS	S - MS	VS
PLRV	S	S	S
Net necrosis	MR	S	MR
PVY (foliar symptoms)[2]	MC - MP	C	P
PVX	R	S	S
Common scab	MR - R	VR	R

[1]S - susceptible; R - resistant; M - moderately; V - very.
[2]C - symptoms expressed clearly; P - symptoms expressed poorly; M - moderately.

TABLE 4.—*Response to late blight at Corvallis, Oregon in 1997 for Umatilla Russet and standard varieties.*

Variety	Foliar Rating[1]	% Tuber Infection[2]	Decay Index[3]
Umatilla Russet	100.0	2.5	0.5
Russet Burbank	93.8	10.0	1.8
Ranger Russet	95.0	42.5	4.8
Russet Norkotah	97.5	27.5	4.8
Atlantic	90.0	7.5	1.3
LSD (p = 0.05)[4]	12.9	19.2	3.5

[1]Foliar injury rating: 0 = 0%; 50 = 50%; 100 = 100% of leaf surface necrotic on 9/4/97.
[2]Percent of tubers with late blight infection at harvest.
[3]Tuber decay severity rating: 0 = no infection; 10 = uncontrollable decay.
[4]LSD's based on 27 original entries.

TABLE 5.—*Physiological defects in Umatilla Russet, Russet Burbank, and Russet Norkotah in 38 Oregon statewide trials, 1988 - 1997.*

	Internal Defects[1]				External Defects[2]	
Variety	HH	BC	BS	Sugar Ends	GC	SB
	%				rating scale[3]	
Umatilla Russet	1.0	0.0	4.7	1.0	4.6	4.3
Russet Burbank	5.6	8.4	1.8	10.2	4.0	4.7
Russet Norkotah	2.5	1.0	1.3	7.1	4.9	4.7

[1]HH = hollow heart; BC = brown center; BS = blackspot bruise.
[2]GC = growth cracks; SB = shatter bruise.
[3]Scale: 1 = severe; 5 = none.

aged 1.9 mg/100 g fresh weight. Vitamin C content averaged 22.0, 17.7, and 21.2 mg/100 g fresh weight for Umatilla Russet, Russet Burbank, and Russet Norkotah, respectively. Protein content averaged 5.9, 4.8, and 4.9 percent, respectively, on a dry weight basis.

RESISTANCE TO DISEASE AND PHYSIOLOGICAL DISORDERS

Umatilla Russet is less susceptible to *Verticillium* wilt and tuber net necrosis caused by potato leafroll virus than Russet Burbank; similar in susceptibility to early blight caused by *Alternaria solani* and potato leafroll virus; is resistant to PVX; and is more susceptible to common scab than Russet Burbank (Table 3). Foliar symptoms of PVY are not always clearly expressed. Foliar susceptibility to *Phytophthora infestans* is similar for Umatilla Russet and several standard varieties, but Umatilla Russet demonstrated some level of reduced susceptibility to late blight tuber infection

and decay at harvest in a single trial at Corvallis, OR in 1997 (Table 4). Umatilla Russet expresses typical foliar and tuber symptoms of bacterial ringrot. The incidence of hollow heart, brown center, and sugar ends was less than for Russet Burbank or Russet Norkotah in Oregon trials (Table 5). In these same trials, Umatilla Russet experienced more blackspot and shatter bruise than Russet Burbank and Russet Norkotah, but fewer growth cracks than Russet Burbank.

USAGE

It is expected that the primary use for Umatilla Russet will be for frozen French fry processing. Like Russet Burbank, Umatilla Russet requires a 120 day growing season to achieve optimum yield and quality. Relative freedom from internal and external defects compared with Russet Burbank has resulted in high marketable yields in Columbia Basin and Treasure Valley production areas of Washington, Oregon, and Idaho. Umatilla Russet is much less susceptible to hollow heart, brown center, and sugar ends than Russet Burbank, which frequently experiences disorders in these production areas. Umatilla Russet appears to be slightly more susceptible to blackspot bruise than Russet Burbank, but the disorder seldom reaches economic levels. Tubers of Umatilla Russet are similar to those of Russet Burbank and Russet Norkotah in length/width ratio but have a tendency for tapered apical ends and are somewhat less attractive than Russet Norkotah tubers for fresh market usage. Seed is available in the U.S. from several western state growers as shown in seed certification directories. Registration has been applied for in Canada. Licensing of Umatilla Russet with McCain Produce Ltd. is under negotiation and seed in Canada will be produced under sublicense through that company.

ACKNOWLEDGMENTS

The assistance of Oscar Gutbrod in evaluation of bacterial ringrot response and Soloman Yilma in production of tissue culture plantlets and nuclear seed stocks is gratefully recognized. Partial financial support of this research was provided by the Oregon Agricultural Experiment Station, the Oregon Potato Commission, the USDA Cooperative State Research, Education, and Extension Service, and the USDA Agricultural Research Service.

LITERATURE CITED

Pavek, J.J., D.L. Corsini, D.R. Douglas, R.E. Ohms, J.G. Gardner, H.C. McKay, C. Stanger, G.E. Vogt, W.C. Sparks, R. Kunkel, J.R. Davis, A.J. Walz, C.E. Dallimore, and J. Augustin. 1978. Butte: A long russet potato variety with excellent dehydrating quality. Am Potato J 55:685-690.