

## **WESTERN COORDINATING COMMITTEE RENEWAL PETITION**

**NUMBER:** WCC-27

**TITLE:** Potato Variety Development

**DURATION:** October 1, 2000 – September 30, 2005

### **DESCRIPTION AND JUSTIFICATION:**

The western states represented by WCC-27 produced approximately two-thirds of all potatoes grown in the U.S. in 1998. The predominant variety for many decades, both for processing and fresh markets, has been Russet Burbank, which accounted for 65% of the western U.S. potato acreage in the early 1980's but only 50% 1998. This slow steady decline in Russet Burbank has been offset, not by one variety but by the increased use of many newer varieties. These include Ranger Russet, Umatilla Russet, Shepody, Russet Nugget, Russet Norkotah, and several clonal selections of Russet Norkotah. Chipping varieties, fresh market red-skinned and fresh market white-skinned varieties have also seen some shifts from one or two dominant varieties to numerous varieties, each with improved adaptation to different growing, storage or processing conditions, or market preferences. An increase has occurred in acreage of Snowden and Frito Lay varieties; CalWhite has replaced White Rose as the dominant long white for fresh market; Dark Red Norland and Red LaSoda still dominate the red-skinned varieties, but new releases from the western region indicate the probability of changes. An increase in yellow-flesh acreage, primarily Yukon Gold variety, has occurred in recent years in response to increased market demand; breeders in the western region have increased emphasis on yellow-flesh varieties. Private European seed companies have begun to export yellow flesh varieties, which are common in Europe, to the U.S, facilitated by the opportunity to protect the rights to their seed.

Russet Burbank produces oblong to long, russet-skinned tubers with high solids, has a long storage dormancy, and produces excellent baked and processed products. Despite these strengths, Russet Burbank has serious weaknesses. Russet Burbank is susceptible to Verticillium wilt, early blight, late blight, most potato viruses (including leafroll net necrosis), and some physiological disorders including hollow heart, brown center, internal brown spot, blackspot bruise, and dark-end fries caused by sugar accumulation in tuber stem ends when the crop is stressed. It is much more susceptible than most cultivars to knobs, off-shapes, and internal and external defects associated with uneven growing conditions caused by fluctuating temperature and moisture. Serious quality reduction due to small tuber size and internal disorders aggravated by high temperatures is not uncommon for this variety.

Russet Burbank requires a high level of management, requiring more fertilizer, water, and pesticides than are required for most alternative cultivars. The recent movement toward more efficient use of fertilizers and irrigation, and less dependence on

agricultural pesticides, adds urgency to the need for alternative cultivars better adapted to low input production.

Russet Norkotah has become the predominant fresh market variety in many areas, as well as early season processing. It is early maturing with very smooth dark russet-skinned tubers that have good storage characteristics. The tubers are resistant to most physiological disorders resulting in high U.S. No. 1 grades. The vines, and tubers, are susceptible to many viral and fungal diseases and to environmental stresses. These susceptibilities frequently result in early dying and low yields. Growers have compensated by increasing nutrient and pesticide inputs. Western region breeders have made several Russet Norkotah clonal selections with increased vine vigor. Characterization of these clonal selections is incomplete, but preliminary indications are that tuber yield is higher, maturity is lower, and input requirements are lower.

Evaluation of germplasm from a variety of sources under varying conditions offers the greatest probability of identifying superior new potato cultivars with improved pest resistance and reduced production inputs. Varietal materials from a wide variety of sources are tested through the WCC-27. Materials that are successful in the Northwest Tri-State (Washington, Oregon, Idaho) and the new Southwest Region (Texas, Colorado, California) variety evaluation programs, as well as material from other programs, are incorporated into the WCC-27 evaluation scheme. Combining promising new genetic technologies and wild germplasm with traditional breeding efforts will result in superior new cultivars. It is vitally important that germplasm be continually evaluated and incorporated into cultivars that will improve their consumer quality and the environment.

Issues of increasing importance include late blight disease, transgenic and other biotechnology breeding tools, and plant variety protection. Western region breeders are active in addressing these issues. It is essential that they are discussed from many perspectives and that strategies be developed and implemented as a team.

A regionally diverse interdisciplinary team approach is critical to the success of the potato variety development program. Improvement or replacement of Russet Burbank, Russet Norkotah, and other varieties will require the combined efforts of breeders, physiologists, pathologists, agronomists, biotechnologists, entomologist, virologists, extension specialists, economists, growers and industry working in concert.

### **OBJECTIVES:**

1. Develop and exchange information on promising new potato selections among scientists and industry representatives.
2. Provide uniform, high-quality seed to each participating state for potato selections evaluated in regional trials.
3. Coordinate studies to optimize cultural management, disease and pest resistance, storage and processing characteristics that result in new potato selections that can

- be produced with minimal environmental impact and optimum usage under each participating state's growing conditions.
4. Strengthen linkages with potato processing and fresh pack industries involved in the development and acceptance of new potato selections and releases.
  5. Discuss major issues facing the scientific community and industry and develop recommendations for addressing those issues.

### **EXPECTED OUTCOMES:**

The WCC-27 cooperative testing program will result in superior new potato cultivars for the western U.S. New cultivars will potentially improve production efficiency, reduce pesticide and fertilizer usage, reduce agrichemical contamination of water resources, contribute to the health of the western potato industry and local economies, and maintain reasonable potato prices to consumers throughout the U.S. It is anticipated that superior germplasm identified through these coordinated efforts will benefit other U.S. producing areas as well.

Replacement for, or improvement of, Russet Burbank and Russet Norkotah are now achievable goals. New cultivars and advanced selections emanating from the WCC-27 are being used in western states. Ranger Russet, a cultivar which has significantly less hollow heart and brown center than Russet Burbank, is utilized for processing directly from the field or short term storage. Russet Norkotah clonal selections ("strains") represent the majority of acres of that variety in several states. Other recent releases, including CalWhite, Gem Russet, Cherry Red, Bannock Russet and CalRed, have impacted fresh market. Continued development of improved chipping, fresh market and specialty is expected. The acres planted to WCC-27 developed varieties is expected to continue to rise.

### **EDUCATIONAL PLAN:**

Processing and fresh market industry representatives have a key role in developing, adapting and utilizing the information generated by the coordinated efforts of WCC-27. Cooperative Extension specialists and agents/advisors are integral participants in WCC-27. Regional trials are often located in grower cooperator fields for field day observations and programs. The continued participation in WCC-27 is indispensable to the success of the program.

Annual meetings are held on a rotating basis in Washington, Oregon, Idaho or Colorado in conjunction with each state grower conferences, and the NW Tri-State and the SW Regional groups' annual meeting. Summaries of all regional trials are distributed and discussed. This allows and encourages dialogue among scientists, growers, extension and industry personnel.

Results of WCC-27 are published in the American Potato Journal, National Potato Germplasm Evaluation and Enhancement Report, State Experiment Station special reports, and other publications.

**PARTICIPANTS:**

*State Agricultural Experiment Stations:*

	<i>Expertise</i>		<i>Appointment</i>		
			<i>%Research</i>	<i>%Extension</i>	<i>%Teaching</i>
CA	R.E. Voss	variety evaluation		100	
CO	D.G. Holm	potato breeding	92	8	
MN	C.A. Thill	potato breeding/genetics	75		25
MT	B.J. Jacobsen	plant pathology	40	50	10
NM	M. O'Neill	plant/soil water relations	90	10	
	C. Owen	agronomy/irrigation	100		
OR	E.P. Eldredge	agronomist	100		
	D. Hane	disease resistance	100		
	S.R. James	agronomy	75	25	
	A.R. Mosley	potato prod.physiology	55	45	
	K.A. Rykbost	cultural mgmnt, agronomy	60		
	C.C. Shock	agronomist	80		
TX	J.C. Miller	genetics/plant breeding	60		40
	D.C. Scheuring	genetics/plant breeding	100		
	J.W. Koym	genetics/plant breeding	100		
WA	R. Knowles	post-harvest variety eval. potato cultivar evaluation	100		
	R. Thornton	cultivar evaluation, potato varieties, cultural practices	25	75	

*USDA-ARS:*

ID	D.L. Corsini	plant path., potato breeding	100		
	S.L. Love	potato variety development	50		
	R. Novy	breeding and genetics	100		
WA	C. Brown	breeding, genetics, gene transfer	100		

Relevant persons and agencies in ARS and the Western Directors have been Contacted with a request to join WCC-27.

**OPERATIONAL STRUCTURE:**

Administrative Advisor:	Liaison with western university directors of the Agricultural Experiment Stations
Chair:	Coordinates annual meetings
Secretary:	Records annual meeting minutes
Subcommittee chair, Russet Trial:	Coordinates and reports on russet variety trials
Subcommittee chair, Red Trial:	Coordinates and reports on red-skinned Variety trials
Subcommittee chair, Chipper Trial:	Coordinates and reports on chipping variety Trials

**SIGNATURES:**

Administrator Advisor

Date



8-15-00

Chair, Western Director's Association

Date

## **ATTACHMENTS:**

### **ACCOMPLISHMENTS:**

**CULTIVAR RELEASES.** Releases by WCC-27 cooperators during the current period include Bannock Russet (A81473-2), Umatilla Russet (AO82611-7, Russet Legend (COO83008-1), Crestone Russet (CO80011-5), IdaRose (A82705-1), Gem Russet (A8495-1), Cherry Red (DT6063-1R), Keystone Russet (AC83064-1), Silverton Russet (AC83064-6), Klamath Russet (AO85165-1), Mazama (NDO2686-6R), Winema (NDO2438-6R), CalRed (A79543-4R). In addition, Colorado Russet Norkotah #3, Colorado Russet Norkotah #8, Texas Norkotah Strain 112, Texas Norkotah Strain 223, Texas Norkotah Strain 278 were released for commercial production. Formal application Under Plant Variety Protection was made for several WCC-27 varieties.

**ECONOMIC IMPACTS.** The acreage of all above listed recent releases, and other WCC-27 releases, is tens of thousands of acres. Umatilla Russet, a 1998 western release, has already grown to more than 50,000 acres. Ranger Russet, a 1977 release, is currently the fifth leading U.S. variety. Specific management practices for several of these varieties have been defined. Some of these are available electronically at <http://www.css.orst.edu/variety.htm>. These new and improved varieties have helped growers, marketers and processors to remain competitive during a period of relatively low prices.

**WCC-27 POLICY IMPROVEMENTS.** A Plant Variety Protection protocol, combining individual state AES policies, private industry goals, individual and regional variety development programs, and WCC-27 members goals, is being developed. The guidelines will address seed source and quality, fee structure, return to researchers and institutions, regulatory considerations for transgenic selections and the use of proprietary germplasm in hybridization programs. Seed increase policies to maintain better control over germplasm and varieties prior to release have been developed.

**INFORMATION EXCHANGE AND COOPERATIVE EFFORTS.** Cooperation by WCC-27 participants has extended beyond the original regional variety trial framework. The late blight crisis in the U.S. potato industry is being addressed by WCC-27 Cooperators. All selections and varieties in the regional trial are tested for late blight resistance at three locations: Kern County, California; Corvallis, Oregon; and Mt. Vernon, Washington. Viral resistance for these clones is routinely evaluated at Hermiston, Oregon. Resistance from several sources is being incorporated by USDA and state WCC-27 breeders. New approaches to variety improvement such as gene transformation are also being utilized by WCC participants on a cooperative basis using university and USDA-ARS resources to produce improved varieties for testing in the regional trials.

WCC-27 annual meetings provide a unique opportunity for program participants and Industry representatives to share information, compare trial results, and discuss issues that impact the region's industry. In addition to annual meetings, participants exchange

thoughts and ideas through use of e-mail and the Internet. Performance information for most advanced western regional clones is routinely provided at the Central Oregon website (<http://www.css.orst.edu/coarc/database.htm>). These interactions lead to greater efficiency in resource allocation, reduced duplication of effort, effective communication between industry and research scientists, and ideas for new research projects to address important issues and problems.

#### **RECENT PUBLICATIONS:**

Mosley, A.R., S.R. James, K.A. Rykbost, D.C. Hane, C.E. Stanger, C.C. Shock, J.J. Pavek, D.C. Corsini, J.M. Miller, Jr., S.L. Love, R.E. Thornton, D.G. Holm and R.E. Voss. 2000. Century Russet: A High-yielding Fresh Market Cultivar with Verticillium Resistance. *Amer J of Potato Res*: 77: (In Press).

Mosley, A.R., S.R. James, C.C. Shock, D.C. Hane, K.A. Rykbost, B.A. Charlton, D.G. Holm, S.L. Love, D.L. Corsini, J.J. Pavek, and R.E. Thornton. 2000. Russet Legend: A Full Season Long Russet for Processing and Fresh Market use. *Amer J of Potato Res* 77:77-81.

Mosley, A.R., S.R. James, D.C. Hane, K.A. Rykbost, C.C. Shock, B.A. Charlton, J.J. Pavek, S.L. Love, D.L. Corsini, and R.E. Thornton. 2000. Umatilla Russet: A Full Season Long Russet for Processing and Fresh Market Use. *Amer J of Potato Res* 77:83-87.

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Mosley, A., D. Hane, S. James, K. Rykbost, C. Shock, B. Charlton, and E. Eldredge. 1998. OREGON. National Potato Germplasm Evaluation and Enhancement Report, 1997. ARS-148, October, 1998. K. Haynes, ed. USDA, ARS, Beltsville Agricultural Research Center, Beltsville, Maryland. pp 321-338.

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Love, S.L. 2000. Founding clones, major contributing ancestors, and exotic progenitors of prominent North American potato cultivars. *Am. J. of Potato Res.* 76(5):263-272.

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- Love, S.L., J.J. Pavek, and A. Thompson-Johns. 1998. Breeding progress for potato chip quality in North American cultivars. *Amer. J. Potato Res.* 75:27-36.
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