

10, 11, and 14 and Russet Norkotah-Selection 3 and Selection 8.

Cultivars and clonal selections developed by Colorado State University accounted for 57% of the 2002 fall potato acreage planted in Colorado. Approximately 48% of the Colorado certified seed acreage accepted for certification, was represented by cultivars and line selections developed by CSU or in cooperation with other agencies. Advanced selections accounted for another 6% of the seed acreage.

Russet Nugget, released by Colorado in 1988, accounted for 13% of the acreage making it second in area planted in the San Luis Valley and the seventh most popular russet cultivar in the United States.

Of the Russet Norkotah fall potato acreage in Colorado, 66% was planted to Colorado Russet Norkotah Selections 3 and 8.

Silverton Russet, named in 2001, is currently among the top five russet cultivars being grown in six fall potato production states. For russet cultivars, Silverton Russet ranked fourth overall in acreage planted in the United States.

The Colorado Potato Breeding and Selection Program has released or cooperated in the release of 11 cultivars. Conservative estimates indicate that new potato cultivars and clonal selections increased the value of the Colorado fall potato crop by \$11-\$12 million annually due to improved yield and quality.

Cooperative Studies

Primary areas of research collaboration are:

Disease Screening and Evaluation

Robert D. Davidson and Richard T. Zink

Cultivar Specific Management and Storage Studies

Samuel Y. C. Essah

Nutritional Quality/Health Characteristics

Cecil Stushnoff

Late Blight Molecular Studies
Jorge M. Vivanco

We continue to expand our collaborations with the Southwest Regional Potato Group which involves Colorado, Texas, and California. The overall objective of this Group is to develop and evaluate improved potato cultivars to meet the production, marketing, and producer/consumer needs of the Southwest U.S. Other "partners" throughout the United States are supportive in providing breeding material and opportunities to screen our germplasm under various growing conditions and disease pressures not usually available in Colorado.

Acknowledgments

The Colorado Potato Breeding and Selection Program relies on the cooperation of several growers, shippers, processors, and research personnel to assess the adaptability, marketability, and other characteristics of advanced selections from our program. We sincerely appreciate their support and the valuable feedback they provide.

Financial support from the *Colorado potato industry* (Area II and III), the *Colorado Agricultural Experiment Station*, and the *Cooperative State Research, Education, and Extension Service*, for the Potato Breeding and Selection Program is gratefully acknowledged. These funds, coupled with royalties collected from Plant Variety Protection, have allowed us to significantly expand and strengthen our Program and other related CSU potato research efforts.



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Agricultural Experiment Station
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The Colorado Potato Breeding and Selection Program - 2002 Review



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Objectives

The primary objectives of the Colorado Potato Breeding and Selection Program are to develop new potato cultivars with increased yield, improved quality, resistance to diseases and pests, and tolerance to environmental stresses for Colorado. Other objectives are to provide a basic seed source to growers for seed increase and commercial testing; and to evaluate promising selections for potential seed export.

The Colorado Potato Breeding and Selection Program emphasizes the development of russet cultivars. The balance of the breeding effort is devoted to developing red, specialty, and chipping cultivars. This broad approach is important because it recognizes the diverse markets accessed by potato growers throughout Colorado. The development of "low input" cultivars, primarily for reduced nitrogen and fungicide input has always been emphasized.

Additional breeding emphasis is placed on identifying germplasm and developing cultivars that are: (1) immune to PVY; (2) resistant to late blight (foliar and tuber); (3) resistant to storage rots [dry rot (*Fusarium* and early blight) and bacterial soft rot]; (4) resistant to powdery scab; and (5) that have improved nutritional quality and other "consumer" characteristics such as improved red skin color retention and improved shelflife.

Continued emphasis will be placed on breeding for improved postharvest and processing qualities such as lengthened dormancy and ability to process after cold storage. Cultivars with these characteristics will help assure that the potato industry in Colorado will remain productive and in a competitive position.

Significant Accomplishments

Breeding Program. Germplasm is continually being acquired with late blight resistance and virus resistance (PXY, PVY, and leafroll) from various sources. Primary sources are the USDA-ARS in Aberdeen, Idaho; Prosser, Washington; and

Madison, Wisconsin and Oregon State University. All of these materials have been incorporated into the breeding program.

Sixty parental clones were intercrossed in 2002. The primary emphasis of the crossing block was cultivar development and late blight resistance. Seed from 383 combinations was obtained.

A total of 48,153 seedling tubers representing 187 families were produced from 2000 and 2001 crosses, for initial field selection in 2003. These seedlings represent crosses segregating for russet, reds, chippers, specialty types, and disease resistance/immunity (PVX, PVY, PLRV, and late blight). Second thru fourth size seedling tubers will be distributed to Idaho (USDA), Maine (USDA-Beltsville), Minnesota, Oregon, Texas, and Alberta, Canada. Additional seedlings tubers for planting in 2003 will be obtained from Dr. Richard G. Novy, USDA-ARS, Aberdeen, Idaho; Dr. Dermot Lynch, Agriculture Canada, Lethbridge, Alberta; and Dr. J. Creighton Miller, Texas A&M University, College Station, Texas.

Selection Program. Colorado grew 77,072 first-year seedlings in 2002, with 848 being selected for subsequent planting; evaluation, and increase in future years. Another 1,195 clones were in 12-hill, preliminary, and intermediate stages of selection. At harvest, 282 were saved for further observation. Forty-two advanced selections were saved at harvest and will be increased in 2003 pending final evaluations.

A total of 205 samples were evaluated for two or more of the following postharvest characteristics: blackspot susceptibility, storage weight loss, dormancy, enzymatic browning, specific gravity, french fry color, french fry texture, and chip color.

Colorado advanced selections evaluated in the Southwest Regional Trials, Western Regional Trials, or by producers, included 10 russets (AC87084-3RU, AC89536-5RU, AC92009-2RU, AC93026-9RU, AC93047-1RU, CO92077-2RU, CO93001-11RU, CO93016-3RU, NDC5372-1RU, and TC1675-1RU),

6 reds (CO89097-2R, CO93037-6R, CO94019-1R, CO94065-2R, NDC5281-2R, and NDC6184-3R), 3 chippers (AC87340-2W, BC0894-2W, and NDC6084C-2W), and 6 specialty selections (CO94165-3P/P, CO94183-1R/R, CO94222-6R/U/Y, VC0967-2R/Y, VC0967-5R/Y, and VC1002-3W/Y).

Advanced selections/recent releases undergoing commercialization include Cherry Red (DT6063-1R), Fremont Russet (CO85026-4), Durango Red (CO86218-2) and BC0894-2. BC0894-2W is a chipper with international export potential. Two additional selections, showing potential for release include AC89536-5RU and CO89097-2R.

Forty-nine Colorado selections were screened for late blight resistance by Oregon State University. About 45% of the selections show relatively high levels of resistance to foliar infection.

Research Impact

Since 1975, there have been seven potato cultivars released by Colorado State University (CSU). They are Centennial Russet (1976), Sangre (1982), Ute Russet (1986), Russet Nugget (1988), Chipeta (1993), Keystone Russet (2000), and Silverton Russet (2000). CSU also cooperated with other agencies in the naming of Gemchip (1989), Frontier Russet (1990), Ranger Russet (1991), Century Russet (1995), and Russet Legend (1999). Russet Legend was selected from a cross of Century Russet and WNC672-2 made by the Colorado Potato Breeding and Selection Program in 1983. Clonal selections released by CSU include Sangre-Selection

