

# Superb New Potatoes Offered by Breeders

**W**hen was the last time you snacked on crunchy potato chips, ordered a serving of golden fries, or sliced open a piping-hot baked potato? If you're like most Americans, you eat these or other potato products several times a week.

To satisfy our appetite for potatoes, ARS scientists breed and test promising new tubers for tomorrow. These potatoes not only please shoppers, but also meet growers' needs for hardy, productive plants suitable for producing in the West.

ARS' potato-breeding effort at Aberdeen, Idaho, about 200 miles southeast of Boise, is among the best-known in the nation. Since 1949, the Aberdeen scientists and collaborators have offered superb new potato varieties uniquely suited to key potato-growing regions of Idaho, Oregon, Washington, California, and Colorado. In fact, if you live in any of the western states, chances are good that a premium potato you enjoyed at a restaurant or purchased at the supermarket was a graduate of the Aberdeen breeding program. The team's Ranger Russet, for instance, is one of their most successful. Developed with university colleagues and made available in 1991 to breeders and potato-seed growers, Ranger Russet is now the third most widely planted potato in the United States.

What makes a potato perfect? The qualities of the perfect potato mostly depend on its intended use, says plant pathologist Dennis L. Corsini. He recently retired from ARS at Aberdeen and is now a collaborator.

"For baking or processing into fries," he says, "you want a potato that has relatively little water and more of what we call solids. These are compounds such as starch that give a potato its texture. High-solids potatoes tend to absorb less oil when fried.

"On the other hand, for boiling to make whipped potatoes or potato salad," says Corsini, "you want a potato that has more water and comparatively fewer solids."

## Sidestepping Storage Dilemmas

How a processing-type potato responds to long-term cold storage is critical. "Most potatoes grown for processing are harvested at about the same time all across the country," Corsini says. "Since they can't all be processed at the same time, most end up in storage, often for as long as 10 months.

"Once you dig them up," he explains, "all potatoes begin converting their starch into sugar." The best potatoes for processing into fries or chips are those that convert starch into sugar very slowly. During frying, these lower-sugar potatoes are unlikely to darken and develop an unwanted burnt-sugar flavor. Higher-sugar potatoes are more likely to have those problems.

Cool storage temperatures inhibit rot and other potato diseases and thwart sprouting. But coolness enhances the problematical conversion of starch to sugar.

PEGGY GREB (K10149-1)



Geneticist Rich Novy (background) and plant pathologist Dennis Corsini harvest tubers of an experimental potato selection.

PEGGY GREB (K10161-1)



Ivory Crisp potatoes (foreground) are ideal for chips, and Alturas potatoes (background) make great fries.



A technique called reconditioning has to be used for some potatoes that don't do well in cold storage. After they are taken out of cold storage, and before they can be processed, these tubers are reconditioned, that is, warmed for several weeks to lower the levels of sugar that accumulated.

Besides needing little—if any—reconditioning, candidate potatoes also need to be free of defects like knobs, growth cracks, or hollow heart—the odd cavity that sometimes shows up in a potato's center. Disease resistance is also key. "Some of the potato cultivars we've recently released are moderately resistant to tuber rot caused by the late-blight fungus," says ARS plant geneticist Richard G. Novy at Aberdeen. "Most are also resistant to an early death from diseases like *Verticillium* wilt."

### Collaborations Speed Development and Testing

The process of breeding and testing potato varieties and making them available as seed can easily take 12 to 15 years. This work could take even longer if it weren't for the collaborations of ARS scientists and their university and industry colleagues. For example, the Aberdeen scientists are part of the unique Tri-State Potato Variety Development Program. It links their expertise with that of co-investigators at Oregon State University, Washington State University, and the University of Idaho. Varieties from the program are released jointly by ARS and the universities.

PEGGY GREB (K10155-1)



Preparing to unload harvested potatoes.

PEGGY GREB (K10167-1)



Postdoctoral geneticist Anne Gillen uses a digital image analyzer to see differences in DNA that could help determine whether a potato plant carries virus-resistance genes from a wild relative.

“This alliance,” says Novy, “has a big impact because growers in the three-state region produce about 50 percent of the U.S. potato harvest.” Since 1985, when the program began, 17 Tri-State varieties have been released.

The ARS potato breeders also work closely with colleagues from the University of California at Davis, Colorado State University, North Dakota State University, and Texas A&M University.

“These collaborations among scientists from different regions and disciplines,” says Novy, “save time and money by speeding the process and preventing duplication of effort.”

### Six Terrific New Tubers

Why do we need so many new and different potatoes? To meet market demand for higher yield, improved quality, and better resistance to insects and diseases. Higher yields and better quality make producing and processing more efficient. “In turn, that helps keep consumer prices stable and may even lower them,” Novy points out. Enhanced insect and disease resistance can also reduce the need for pesticides.

In all, the potato breeders aim to provide new varieties that have a carefully developed selection of genes for traits that will score big with growers, processors, and consumers alike.

Currently, most of the research focuses on breeding and evaluating candidate potatoes that are dual purpose. As such, they can be processed into products like fries or dehydrated flakes for making mashed potatoes, yet can also be sold fresh in the produce section.

In the last several years, tubers offered to western growers have included several dual-purpose russet-type potatoes. They are known for their excellent texture; long, attractive shape; and the distinctive netting, or russetting, of their light-brown skin.

Following are highlights of recent and upcoming Tri-State potatoes:

- Alturas is a very high-yielding potato that was originally developed for dehydrated products. It is now being evaluated for the fresh produce market and for processing into fries.

This potato did very well when taken out of cold storage and used immediately—without reconditioning—to make fries. What’s more, in 32 trials in Idaho, Oregon, and Washington, Alturas yielded 37 percent more than the industry standard, the venerable Russet Burbank. Alturas also had a higher percentage of premium U.S. No. 1 tubers.

- Ivory Crisp is a round, white tuber ideal for processing into chips. “The biggest selling point of this potato,” Novy says, “is its ability to produce good-quality chips even if taken immediately from long-term cold storage.” North Dakota State University will participate in its release.

- Klamath Russet, a fresh-market variety, “was identified by Oregon collaborators as well-suited for growing in the

Klamath Basin of southern Oregon and northern California,” says Novy. It was released in 2001.

- Wallowa Russet, offered in 2002, is a dual-purpose potato that produced more U.S. No. 1 tubers than Russet Burbank at many sites in Oregon, Washington, and Idaho.

ARS, Colorado State University, and the University of Idaho teamed up to launch two new cultivars in 2001:

- Silverton Russet, a dual-purpose potato, originated from Aberdeen and was selected and developed further in Colorado. It has strong potential for high yields from irrigated fields in the West and Midwest.

- Keystone Russet is a fresh-market variety that produced high yields in Colorado.

PEGGY GREB (10153-1)



Corsini and Novy evaluate tubers of the red-skinned variety *IdaRose* during harvest. *IdaRose* originated from the Aberdeen breeding program and was named and released in 2000.

With the exception of Ivory Crisp, all these varieties originated from crosses made by Joseph J. Pavek. A long-time potato breeder with ARS at Aberdeen, he is now retired.

The scientists are now readying a potato that is remarkably resistant to the late-blight fungus. The tuber will be especially welcomed by growers whose fields have been hard-hit by this formidable pathogen.—By **Marcia Wood**, ARS.

*This research is part of Plant, Microbial, and Insect Genetic Resources, Genomics, and Genetic Improvement, an ARS National Program (#301) described on the World Wide Web at <http://www.nps.ars.usda.gov>.*

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