Protecting potato germplasm is like money in the genebank

"In spite of its virtues, the potato needs improvement," said John B. Bamberg, USDA-Agricultural Research Service potato geneticist and project leader for the U.S. Potato Genebank, Sturgeon Bay, Wis.

Aiding that improvement process are about 250 close relatives of the potato growing in the wild. These "cousins" carry resistance genes that have helped them survive for centuries, and these resistance genes can be incorporated into commerical varieties to develop new, strengthened varieties. The Sturgeon Bay genebank holds almost 5,000 samples of more than 150 potato species in the national collection.

Two key wild species grow in the Southwest. *S. fendleri* grows in the mountains of west Texas and in southern New Mexico and Arizona. *S. jamesii* has been found in the same places and northward into Utah and Colorado, often near archeological excavation sites.

"Wild tubers found in the Southwest are similar to common potatoes, except they're small – about the size of marbles," Bamberg said. "But they represent a veritable treasure chest of genetic diversity for potentially useful traits that may someday be bred into new varieties."

Bamberg began exploring these areas in 1992 to address the concerns of the Association of Potato Intergenebank Collaborators. Genebank managers needed to evaluate their methods of preserving genebank diversity scientifically. So,

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These wild potato species held by geneticist John Bamberg may be small, but they may pack an important genetic punch for desirable characteristics that can be bred into new varieties.

EYE ON POTATOES

Bamberg re-collected both *S. fendleri* and *S. jamesii* from the original geographic sites where earlier plants had been collected and stored in the genebank.

Through a random amplified polymorphic DNA analysis, a comparison of a recent collection with the parent population showed that propagation in the genebank did not greatly change the genetic composition of populations.

"These results confirm that our *ex situ* (out of place) methods of increasing seed in genebanks are sufficiently thorough and that we are not losing much genetic diversity," Bamberg said. "An astonishing fact, however, is that the recent collections from the wild were very different from the original samples collected from exactly the same site decades earlier. That knowledge is an important clue that these recollections from *in situ* (on site in their native habitat) populations may be a source of unique new germplasm for world genebanks.

"Thus, these wild populations should not be viewed as just duplicate backups of populations preserved in genebanks."

Germplasm is becoming more valuable as genetic solutions develop.

"The beauty of maintaining the natural population of crop species in their native habitat is that the evolutionary processes continue," said Ned J. Garvey, ARS horticulturist and leader of the Beltsville (Md.) Plant Exchange Office. "The plant populations continue to be challenged by insects, diseases, animals, droughts and fires – and they change genetically in response to these challenges."

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