Preserving The Traits Of Today

U.S. germplasm bank crucial for the future

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PHOTOS BY JOHN ADAMS

Chico Fernandez and his team hand-pollinate potato plants so genetics are not altered. Specially designed greenhouses help reduce chance of cross-pollination from insects.

You may not be familiar with the USDA's potato genebank in Sturgeon Bay, WI, but if you are a potato grower, chances are you benefit from the work they do at the Inter-Regional Potato Introduction Project (NRSP-6) every day.

ARS potato geneticist John Bamberg and his team of five fulltime researchers is responsible for cataloging, preserving, studying and distributing of potato germplasm. Nearly every variety of potato grown today has germplasm (genetic material) that came from the NRSP-6.

Naturally occurring potato species each have specific genetic make-up that is unique to them. Some plants are resistant to frost, others to late blight, white mold, nematodes, etc. Bamberg's job is to seek out and find these species, collect them, and identify individual genetic characteristics. Then they store the seeds, tubers, or live tissue culture in the lab until someone such as a breeder or

For The Potato Of Tomorrow

Most people never see potato berries. These berries can hold up to 300 seeds and are the best way to preserve genetic information.

Potato tubers are stored in a large cooler at NRSP-6. Tubers are easy to collect, but not an ideal way to store genetic information.

Live tissue cultures are preserved when a plant repeatedly fails to produce seeds. Some cultures are over 15 years old.

researcher requests the germplasm.

HOLD KEYS

Why is this work important? Because these naturally occurring species hold the keys to genetic resistance for all potato varieties, including the ones you harvested this fall.

"Yield is influenced by genetic diversity, or hybrid vigor," says Bamberg.

That's one of the many reasons he and his team work so hard to maintain the nation's gene bank and herbarium.

Nearly all potato species are native only to Central and South America. There are only two species native to the United States. So Bamberg must

travel far and wide to search out new genetic resources...resources that may be the future of the potato industry.

As any grower knows, potatoes are susceptible to a wide range of diseases and pests. Luckily, the potato also has a number of closely related species growing in the wild. Each species has a unique genetic make-up from which we can draw genetic resources to help combat disease, pests, and even nature.

Project gardener Charles "Chico" Fernandez's job is to make sure that the genebank has a healthy supply of seeds. But he doesn't have to travel to exotic places to collect new seeds, he just has to head out to the greenhouse.

When it is deemed that the genebank needs more seeds of a specific species, Fernandez goes to work on a seed increase. He grows that species in specially designed insect-free greenhouses and then hand pollinates each flower. After the plant produces fruit, the fruit is collected. The seeds are removed in the lab and stored.

There are advantages to storing seeds rather than tubers including reduced risk of disease, storage and mailing size, and frequency of regeneration.

Some species, however, refuse to reproduce in the greenhouse. These plants must then be stored in a sterile growing medium (in vitro) and then stored. It's Max Martin's job to clone and store living cultures of those species. Nearly 700 genotypes are kept in sealed test tubes and stored in refrigerators.

Some plants have been in tissue culture for more than 15 years, according to Martin.

The main purpose of NRSP-6 is to propagate the potato gene bank, but the work doesn't end there.

FROST HEARTINESS

In addition to his work on the gene collection, Bamberg has also been working on a frost heartiness project for nearly 10 years. The purpose of this experiment is to identify and isolate species that have a particularly good resistance to frost. The results of this work could be far reaching in the future. Genes that give a specific plant the ability to resist frost damage could one day be bred into a marketable cultivar.

With over 1,000 different genotypes to examine, identifying the one that is the most frost resistant isn't easy, which is why Bamberg's research is so important.

"Finding a plant that is both frost-hearty and has good yield is a tough nut to crack," says Bamberg.

While the potato genebank in Sturgeon Bay doesn't have the most technologically advanced lab, or cutting-edge cryogenic capabilities, the work done is as important as any other research in the industry. Maintaining genetic information is not only important for the future of potatoes, but also crucial. The potato of the future depends on the genetic treasure trove at NRSP-6 to help fight diseases, pests, and other unforeseen potato problems.

So next time you take a look at your successful crop, or head out in the spring to plant, think about the hard work of the people at NRSP-6 and silently thank them for their germplasm.