



WISCONSIN-BASED U.S. POTATO GENE BANK AIDS PERUVIAN GROWERS

State plays key roles preserving potato diversity and in the upcoming World Potato Congress

By Alfonso Del Rio, Ph.D., U.S. Potato Genebank Research Lab, UW-Madison Department of Horticulture

Born in Lima, Peru, where he obtained a degree in biology, Alfonso Del Rio went on to earn master's and Ph.D. degrees in plant breeding and plant genetics from the University of Wisconsin (UW)-Madison.

In 1992, while working on his master's thesis at the International Potato Center in Peru, Dr. John Bamberg, head of the U.S. Potato Genebank and a UW professor, offered Alfonso a research

assistantship to join his program as a graduate student.

"The U.S. Potato Genebank [USPG] fulfills the very important mission of preserving plant diversity for future generations," Del Rio explains.

"Things are changing all around. Climate patterns are different and more unpredictable today, pests and diseases are spreading to places where they did not exist before, and people are now more interested in better nutrition," he says.

"Studying and safeguarding germplasm that can help scientists to find solutions to all of the problems is a great feeling," Alfonso says. "But the task also presents big responsibility."

His work at the USPG has also allowed Del Rio to network with colleagues from all over the world,

Above: In June 2017, Alfonso Del Rio evaluates potato tubers at the U.S. Potato Genebank's experimental fields in Puno, Peru.



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including Cusco, Peru, birthplace of the potato and host of the 2018 World Potato Congress, May 27-31.

As part of the World Potato Congress, Del Rio is co-chair for a technical session titled “Potato Biodiversity and its Use in Breeding, Nutrition and Health.”

“Holding the World Potato Congress

for the first time in Latin America will be an excellent opportunity to integrate Latin American professionals, farmers and students with members of other regions of the world,” Del Rio enthuses.

“I feel both groups will benefit from the interaction and learn about what’s new from a global perspective. I hope this also unlocks chances of

Above: Peruvian women wear traditional clothing while they work, sharing their views about the potatoes, which Alfonso Del Rio says is a positive thing, as he wants to develop and select varieties that the local farmers like. The gentleman wearing the baseball hat in the second image is a Peruvian cooperador, Jesus Arcos, who’s in charge of the potato program in Peru’s Puno region.

future collaborations and educational opportunities,” he remarks.

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INCAN POTATO PRODUCTION

From a historical view, having the meeting in Peru offers participants the opportunity to visit the place where potatoes originated and to possibly see how local farmers continue practicing potato cultivation as it was done during the Incan Empire.

The meeting of the Latin American Potato Association will be held in conjunction with the World Potato Congress, offering additional chances to learn about potato research in an important region.

Del Rio has networked with the CIP—the International Potato Center in Peru—and non-governmental organization (NGO) partners, as well as the National Institute of Innovation (INIA) in Peru during trips there.

His work in Peru has been focused on research to promote sustainable agriculture, mitigate climate change and improve conservation and protection of genetic diversity.

Back home, since 1992, Del Rio and the USPG have been collecting potato germplasm in the Southwest United States, with the main goal



of expanding the geographical representation of two potato species native to this country, *Solanum fendleri* and *S. jamesii*.

“We were able to successfully use DNA-based markers to identify geographic regions with high levels of genetic diversity. Now we are integrating climate models to identify places at risk, so we can set up collecting priorities,” Alfonso says.

Valuable genetic traits have been found in the newly collected materials. The USPG’s efforts in collecting have called the attention

Above: In the Andes, damage caused by frost in potato fields is serious and produces massive reduction in yield or total loss. Shown is an advanced potato line that is a cross between native Peruvian potatoes and one wild species, *S. commersonii*, known for extreme cold hardiness.

of the international community.

“In 2013, our collecting activities were featured in the documentary “Seeds of Time,” where it was emphasized that, in a changing world, our work is critical for biodiversity protection and conservation for the future,” Del Rio relates.

He goes on to describe one instance when international cooperation had a positive outcome and brought benefits to farmers.

FROST DAMAGE

“In the Andes, damage caused by frost in potato fields is serious and produces massive reduction in yield or total loss,” he says. “At the USPG, we explored the alternative of breeding for enhanced resilience to low temperatures.”

“For that purpose, we developed crosses between Peruvian native potatoes and one wild species, *S. commersonii*, known for extreme cold hardiness. The families created showed segregation for good levels of tolerance to freezing temperatures,” Del Rio notes.

The next step was to send thousands



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of seeds to Peru for field trials, where they were planted in diverse fields known for frost episodes during the growing season.

“In cooperation with colleagues in Peru, we conducted evaluations to identify plants with good agronomic characteristics and exceptional levels of frost tolerance. After years of selection and evaluation, we identified two elite species with attractive tuber shape and good productivity levels and hardiness,” he says.

Now these selections, created at the USPG facilities in Sturgeon Bay, Wisconsin, are in the process of being released as new varieties at the end of 2018 by the Peruvian national program in Puno.

“Recently we have been working with them on a project aimed to use native potato varieties to make beer, which has been successful. This could be a great opportunity to add a new



market for potatoes not only in Peru but elsewhere,” he proposes.

Over the years, with the help of CIP and local farmers, Del Rio and the USPG have evaluated responses of many Peruvian native potato varieties to the application of calcium (in the

Above: Alfonso Del Rio (second from right) shows, from left to right, Jesus Arcos (INIA-Puno), Silvia Rondon (Oregon State University) and Jiwan Palta (UW Madison) potato plants in Puno, Peru.

form of gypsum powder) and found that it significantly increased yield and tuber quality.

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For example, yield increases ranged from 10 to 100 percent over the control. Between the years 2012 and 2014, they conducted a large evaluation where more than 1,200 native varieties, part of CIP's collection, were tested for responses to calcium.

The results revealed that about 30 percent of them showed positive response.

IMPROVED YIELD & QUALITY

"This was a great development, since it showed there is a way to improve yield and quality in native cultivars using gypsum that is very affordable and easy to apply at planting," Del Rio remarks.

Throughout Latin America, there is a lack of seeds of good quality. Potato farmers in most of the developing countries recycle their own harvested tubers to be used as seeds.

"A couple of years ago, I helped CITE Papa [Center for Innovation and Technology Transfer for Potato and other Andean crops] secure external funding and validate a technology to produce disease-free seeds in Latin American cultivated potato species," Del Rio explains.

"This technology, developed by the Wisconsin-based company CETS [Controlled Environment Potato Seed Production System] generates seeds under controlled conditions, and therefore can be implemented in any place at any climate zone," he says.

The results of this project showed that production of quality tuber seeds of native potatoes was possible with CETS, and it unlocks an opportunity to implement this system in the region.

A lot of this work seems to lead up perfectly to the World Potato

Congress in June.

"I hope the World Potato Congress creates an opportunity to network with colleagues from all over the world and learn about what is happening in every region," Del Rio says.

"I hope we all come back from the Congress with better insights about the global efforts on challenging climate change, preserving genetic diversity, integrating technology for research and incorporating new nutrition options," he adds.

"It is very important to think that potato could be an option to fight hunger in many vulnerable societies, so as a global potato community, we should make efforts to identify those places and develop strategies to promote food security and sustainable agriculture," Alfonso concludes. **BCT**



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