

EDITORIAL

Potato technology and innovations as the critical bridge to respond to food security challenges and promote agribusiness in Latin America

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Introduction

Many Latin American potato scientists had long awaited this moment. From May 27th to 31st, the 10th World Potato Congress (WPC) and the 28th Congress of the Latin American Potato Association (ALAP) were held together for the first time, in the historic city of Cusco, Peru. The World Potato Congress is held every 3 years, and after taking place in North America, Europe, South Africa, China and New Zealand, the long-awaited moment of a congress in South America, the cradle of the potato, had finally arrived.

This year, the event drew more than 800 scientists, representatives of the potato industry and other experts to Cusco. At the same time, the 18th ALAP Congress, which takes place every 2 years, brought together students, researchers, business people, producers and other actors in the value chain. The agenda of the combined congresses included plenary presentations, technical sessions, workshops, information exchanges, discoveries and useful innovations, all presented within the framework of three main topics: biodiversity, food security and business. The seven technical themes chosen for this event included: • Climate Change and Potato Agri-food Systems. • Trends in Potato Consumption and Markets. • Potato Variety Development and Biotechnology • Potato Pests and Diseases • Potato Crop Management • Post-harvest and Processing Technology • Potato Biodiversity and its Relation to Breeding, Nutrition and Health. Most of the 164 presentations came from Latin America, which represented 68% of the total, followed by Europe, with 19%, Africa, with 7%, 5% from Asia and 1% from Oceania (World Potato Congress 2018).

This Congress was an excellent opportunity to showcase research on the sustainable use of potato biodiversity by focusing on its relationship to health and nutrition, its contribution to farmers' incomes, and its potential for responding to the global demand for food that will grow by 50% by 2030. The different sessions were also an opportunity to discuss food security by addressing the issues of varietal development, biotechnology, pest and disease control, crop and seed management and climate change. In addition, consumption and markets, postharvest and processing technologies and culinary innovations were of special interest for people in the potato business.

The activities of the WPC and ALAP congress were complemented by various side events. The day prior the congress, scientists from across the Americas gathered for a meeting of the Latin American Network for Late Blight Research, known as the Red Tizón Latino. This network was founded to coordinate research on that crop disease at a regional level, and was modeled after the European research network EuroBlight. Linked to this meeting, CIP and the

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European Association for Potato Research (EAPR) organized a workshop with public and private partners in the Andes to build R&D collaboration for the development of bio-based solutions to control potato pests and diseases and enhance potato productivity in a sustainable manner in the Andes. The WPC and CIP collaborated on the organization of an event to launch the campaign “Imagine a world without potatoes” in which representatives of multinational companies, potato associations, public sector entities, research centers and international organizations were invited to join the campaign and use its core message to promote the potato. The aim of this campaign is to make sure that the world understands the potato’s importance and potential for providing solutions to current global food and nutrition challenges, just as it has since it first spread around the globe from the Andes 500 years ago. The presentations, posters and workshops of the WPC 2018 and ALAP Congress were complemented by a field day when congress participants had the opportunity to join one of the two trips organized to sites known for their potato conservation and research: The Potato Park and the National Institute for Agricultural Innovation (INIA) Andenes Experimental Station.

The WPC and the ALAP congress were a good opportunity to present potato research and innovation in Latin America and the Caribbean and take a closer look of the region’s role in global potato production. The average annual domestic potato supply in the LAC region has increased from 7.2 million tons in the 1961 – 1963 period to 19.6 million tons in 2011- 2013. By way of comparison, growth rates in potato production in Asia and Africa averaged over 4% for a similar period, i.e. more than double that of LAC. Most of that production is oriented towards human consumption (74%, maintaining this trend throughout the period) and according to FAO, it represents a still relatively low level of processing for industrial purposes of 1% (FAOSTAT 2017).

The role that potato plays in the diets in LAC varies from one area to the next: from basic staple for producer/consumers in the Andean highlands, to a complementary vegetable for urban households in most of South America, to a relatively expensive complimentary vegetable in much of Central America and the Caribbean, and to a popular fast food item in the form of French fries in urban markets throughout the region (Scott, 2011). Per capita consumption of potatoes in Latin America increased slightly from 22 kg / person on average between 1961 and 1963 to 25 kg / person between 2011 and 2013. But these regional trends do not reflect the important differences in trends at the sub-regional and country levels. Peru, is one of the countries where potato consumption has grown significantly, reaching 85 kg / person in 2015. This is due to various public-private policies, rural infrastructure, expansion of supermarket trade focused on potatoes and the gastronomy sector’s promotion of Andean dishes including potato and its products. Brazil and Mexico have increased their consumption, although their absolute values remain low. However, the largest increase in production and consumption of potatoes in South America in the decades ahead is projected to occur in Brazil. In the region’s most populous country, current per-capita potato consumption is still relatively modest compared to other countries. Meanwhile Argentina and Colombia are experiencing downward trends in potato consumption (Scott & Kleinwechter 2017).

Many farmers in LAC, but especially in South America, are interested in growing potato because of its adaptability and relatively short maturity period, and the fact that it can be both a food security crop and an income generator. In addition to being an excellent source of carbohydrates, potatoes have relatively high levels of vitamin C, iron, zinc and antioxidants, which means they can contribute to improved nutrition as well as food security.

The growing conditions vary from country to country and region to region. Some areas have short growing seasons, whereas others have two seasons, and the risk of drought or too much

precipitation is growing due to climate change. Farmers in many areas of LAC also must contend with high disease and pest pressure. These and other factors are responsible for the vast differences in potato yields between the countries in the region. While countries in the Andes region have average yields below 20 tons of potatoes per hectare, most farmers in the Southern Cone produce more than 40 tons per hectare. Closing that yield gap is essential for tapping the potato's full potential to improve the food security and incomes of smallholder families and is thus a central goal of research-for-development organizations such as CIP and national agriculture research and development institutions.

During the Congress, some of the most important areas were outlined in which agricultural research centers and their partners are working to help farmers close the yield gap.

Breeding has long been a priority for organizations dedicated to helping potato farmers in the developing world to increase their yields. Over the years, potato breeders have developed high yielding varieties that are resistant to late blight and virus diseases, which are probably the top constraints for small-scale potato producers in the tropics and subtropics. Most of those farmers lack access to disease-free seed, and funds to purchase the fungicides needed to control the late blight pathogen are scarce. It is also vital that potato improvement programs focus on climate-smart technologies, considering the threats of climate change and its potential impact on farmers, especially in the Andes, Central America and the Caribbean. Resilient, precocious and adapted varieties that can produce enough food under extreme weather conditions are thus needed. There is also a crucial need to develop varieties with better processing and storage characteristics to respond to the requirements of agribusiness.

Improving seed quality, production and distribution. Seed systems are vital for deploying improved potato varieties, but it is important to recognize that many farmers lack access to them. Those farmers either select seed for the next planting season from their own harvest or purchase it from informal sources such as local markets, which usually means that it is of low sanitary quality. This is a major cause of low yields, which means less food and less money for resource poor families. Scientists are recommending an integrated approach that combines clean seed systems with decentralized seed multipliers and the promotion of training in on-farm selection and storage practices that can help smallholders improve the quality of the seed potatoes they plant.

Potato crop management. Research has made significant investments in developing, testing, and disseminating technologies and approaches to help small farmers, men and women, to improve their crop management, and thereby increase food production. These technologies include decision support tools to improve pest and disease control, water-saving irrigation methods, better soil management and other sustainable farming approaches that can enable farmers to improve their potato yields and farm resilience in the face of climate change. Smart agriculture is a novel avenue for resource use optimization based on new monitoring and decision support tools. Remote sensing and geographic information system (GIS) tools coupled with decision support systems and precision agriculture technologies may contribute to increased productivity. Research to develop biocontrol is popular and considered to grow substantially in the coming decade, but there are still few confirmed successes from the field, and specific management tools are still missing (Velivelli *et al.* 2014).

Integrating food security and value chain development. Agribusiness is a diverse and complex sector and a successful value chain requires the entire system to perform. Many challenges exist to enhance potato value chains and may vary between countries and even within countries. CIP has worked with an array of partners on initiatives that have helped smallholders to move beyond subsistence farming and gain access to better-paying markets.

An example of this is CIP's collaboration with the public and private sectors in the Andes region to develop new value chains for native potatoes.

Postharvest management. Another important piece of the puzzle is improving postharvest management, to reduce the loss of potatoes and potato quality. While there is growing awareness of food waste on the retail and consumer levels, which is extremely important, we need to pay more attention to postharvest loss on the farm, in transportation and in storage. Interventions to facilitate inclusive market chains thus need to be complemented by efforts to help farmers improve their postharvest handling and storage. A recent CIP study of potato value chains in Peru and Ecuador documented losses of between 12% and 30%, illustrating the importance of this area of research.

All of us who are working for the development of the agriculture sector in this region need to promote technologies and approaches that can help farmers adapt to climate change, increase their production, and limiting their environmental impacts. These include resilient potato varieties; innovations to accelerate seed production; appropriate technologies to improve the detection and control of potato diseases and pests; and market chain innovations to create income opportunities. As we work on more integrative science and development approaches to help our region's farmers adapt and prepare for the challenges ahead, agricultural research organizations need to collaborate with new partners in the government, business and non-profit sectors. By working together, and with a greater range of partners, we can rise to the challenges and tap the potato's full potential for strengthening food security, reducing poverty and enabling the region's farmers to lead better livelihoods.

I would like to conclude this editorial with a note honoring the memory of Dr. Patricio Malagamba, who during years supported the publication of the ALAP journal, provided guidance on articles about research in potato, and contributed to the development of the sector in Latin America.

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