The LatinPapa Network: a platform for pro-poor potato improvement and varietal dissemination

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Abstract

The LatinPapa Network seeks to enhance international collaboration between potato breeding programs in Latin America and pro-poor varietal dissemination at the national level with civil society partnerships involving private sector, development and base organizations. The initiative supports R&D activities in a total of 12 countries within the framework of the following working modules: 1. potato improvement, 2. varietal dissemination, 3. seed systems, 4. information platforms. The network aims to: 1. combine inputs and information from multiple disciplines, actors and environments to enhance current investments in potato improvement and dissemination, 2. match newly available resistant varieties with local ecologies, resource management options, production needs and markets, 3. systematize policies, processes, procedures and incentives for the uptake of new varieties, 4. exchange experiences in participatory varietal selection and seed systems toward 'scaling up' and adaptation to the regional context, 5. serve as an education, training and information resource in the areas of plant breeding and seed systems, 6. enhance access to and implementation of information technologies and communication strategies that contribute to potato improvement. This paper will present selected advances of the LatinPapa Network: international germplasm exchange, participatory varietal selection, marketing of potato varieties, production of pre-basic seed, adapted farmer seed systems, information & communication platforms.

Keywords: potato improvement, varietal dissemination, seed, information Systems.

Introduction

During the last decades the technical capacities of potato genetic improvement programs in Latin America have grown, resulting in average national yield increases in many countries. Despite success in selected environments, there is still a shortage of new diverse and robust potato varieties and efficient dissemination strategies that make products from genetic improvement available to poor smallholder farmers in marginal environments. On the other hand, the interinstitutional cooperation between and among countries, each with different Research & Development (R&D) demands and strengths, is essential to achieve impact through technological innovation (products & processes) in an increasing complexity context in Latin America: poverty pockets in the Andes and Central America, fast growing processing industries, increased presence of supermarkets, rapid urbanization, and climate change.

This context was discussed by representatives of the potato sector from 10 Latin American countries and finally key opportunities were prioritized during an international workshop held at the International Potato Center (CIP) in Lima, Peru, in September 2004. The lack of a regional platform which facilitates the exchange of experiences and promotes international interinstitutional collaboration was identified as a key need. Based on this concerted need, the Iberoamerican Innovation Network for Potato Improvement and Dissemination, in short the Latin Papa Network, was initiated. Partners and members include: national potato research programs (INIA's), universities, national and regional research and innovation networks, non-governmental organizations (NGO's), private sector (seed / industries) and base organizations (organized farmers / cooperatives). The initiative is supported by Spain's National Agricultural Research and Institute (INIA-Spain) and FONTAGRO (a regional agricultural development fund). At the moment the LatinPapa Network is integrated by eleven Latin American countries, including Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Panama, Peru, Uruguay and Venezuela,

also furthermore by on Spain as the only EU member. The initiative was officially launched during the startup workshop, held between January 15 till 18, 2008, in Peru.

General objective

To co-develop and implement, together with Latin American national programs, an innovation platform for collaborative potato germplasm exchange and improvement, strategic and targeted dissemination of improved potato varieties, development of adapted and functional seed systems and technologies, in combination with adequate shared information and communication environments. All this with the final aim to ensure pro-poor smallholder access to technologies resulting in tangible improvements of either household food security or income (De Haan *et al.*, 2008).

Specific objectives

1. Combine inputs and information from multiple disciplines, actors and environments to enhance current investments in potato improvement and dissemination,
2. Match newly available resistant varieties with local ecologies, resource management options, production needs and markets,
3. Systematize policies, processes, procedures and incentives for the uptake of new varieties,
4. Exchange experiences in participatory varietal selection and seed systems toward 'scaling up' and adaptation to the regional context,
5. Serve as an education, training and information resource in the areas of plant breeding and seed systems,
6. Enhance access to and implementation of information technologies and communication strategies that contribute to potato improvement.

Methodology

The LatinPapa Network foments interinstitutional, horizontal and interdisciplinary collaboration between and among potato Research & Development (R&D) institutions (Bastos *et al.*, 2008). Interventions and project activities are framed around 4 working modules (strategic components):

1. 1. Germplasm exchange, documentation and evaluation. This module seeks that network members have greater access to pre-breeding material (novel sources of resistance), advanced potato germplasm (clones), standard procedures for evaluation (protocols), and breeding expertise (knowledge, peer to peer recommendation).
2. 2. Efficient dissemination of new robust varieties. This module aims to achieve accelerated, targeted and pro-poor release and diffusion of new varieties toward early adoption. Promotion and dissemination strategies include marketing tools (catalogues), demonstration trials, PPP initiatives, linkage of varieties to smallholder organizations, media (radio), among others.
3. 3. Operative and adapted seed systems. This module seeks to share adapted technologies for the production of pre-basic and basic seed among network members (e.g. aeroponics). At the same time it seeks to link seed production technologies to functional formal (Southern Cone) and farmer seed systems (Andean Region). Training is an important aspect of this module.
4. 4. Shared information, institutional learning and operational sustainability. This module proposes that network members, strategic partners and value chains members co-develop and use shared information and communication systems.

The overarching methodological focus of the LatinPapa Network includes the innovation system and value chain paradigms. The innovation systems approach recognizes that sharing technologies and information between and among people, organizations and institutions is essential to an innovation process. In addition that active interaction and collaboration among members of the R&D community is required to turn an idea into a process,

product or market with the potential to effectively benefits poor farmers. Indeed, the outreach of an innovation depends on a complex set of relationships between actors who produce, distribute and apply knowledge. Therefore, the value chain approach is another important paradigm as it ideally seeks integration and collaboration between those organizations that develop, promote and utilize pro-poor technologies.

Organization

The LatinPapa Network has an international coordinator and elected steering committee. Together they are responsible for the general organization and management of the network, in addition to donor relationships. Additionally, in each country has a focal point for the national network. LatinPapa also has five working groups integrated by international experts in the themes addressed: germplasm, dissemination, seed, information and learning, regulatory framework and political incidence.

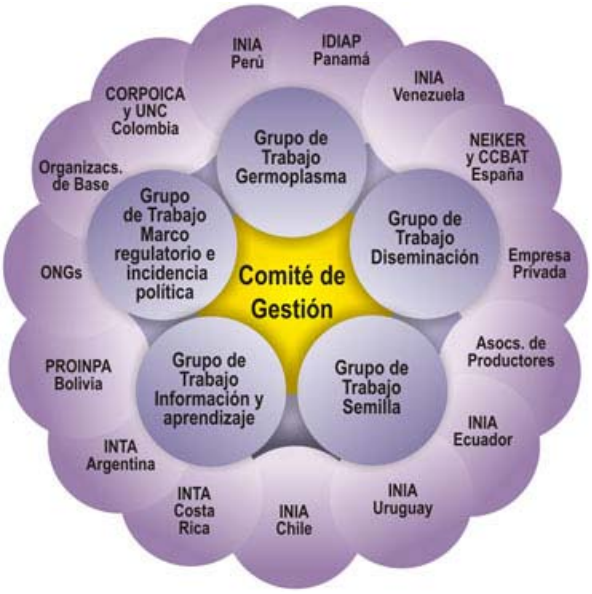

Figure 1. Organization of the overall management of the LatinPapa network (in Spanish)

Network members

International members of the LatinPapa network include the International Potato Center (CIP), McCain foods and *Cambio Alianza Andina*. National members include governmental research institutes and universities such as INTA-Argentina, INIA-Chile, PROINPA-Bolivia, INIA-Uruguay, INIA-Peru, INIAP-Ecuador, EMBRAPA-Brazil, CORPOICA-Colombia, UNC-Colombia, INIA-Venezuela, IDIAP-Panama, INTA-Costa Rica, CCBAT-España and NEIKER-España. More information about each of these institutions can be found on the LatinPapa website: http://www.cipotato.org/redlatinpapa/. In several countries active links with farmer cooperatives and base organizations have been established, e.g. with CONPAPA in Ecuador (http://www.conpapa.com/), COPABOY in Colombia, and ABBA in Brazil (http://www.abbabatatabrasileira.com.br/).

Many of the national coordinating institutions have actively promoted the formation of national innovation networks, e.g. *Consorcio Papa Chile* (Chile), *Red Patata* (Spain), and the *Mesa de la Papa* (Costa Rica). The LatinPapa network is financially supported by the INIA-Spain (http://www.inia.es/), FONTAGRO (http://www.fontagro.org/), STC-Peru, and the Generation Challenge Program (http://www.generationcp.org/).

Figure 2. Some of the international and national member institutions of the LatinPapa network

Selected advances

To facilitate monitoring, a yearly operative plan (AOP) is developed during the annual meetings of the LatinPapa Network. During the implementation phase of the first annual operative plan (AOP 2008), network members prioritized a total of 41 multilateral and 117 national activities. Each activity is detailed in an activity plan and most of those foreseen in the AOP 2008 have already finished while a few are still in process. The AOP 2009 also consists of well over 100 individual activities and accompanying plans. Activities are varied and range from pre-breeding to the dissemination of new varieties. Below, selected advances are summarized:

Module 1 (germplasm)

- Distribution of 837 genotypes from CIP to LatinPapa Network members, including advanced clones with late blight (Phytophthora infestans*) and virus resistance, heat and drought tolerance, and true seed families. These materials are currently used for national selection and/or as parental materials.*
- Advanced clones generated in national crop improvement programs have shared between Chile, Costa Rica, Spain, Uruguay and some other countries.
- At CIP, pre-breeding research on new sources of Phytophthora infestans resistance, including several species belonging to the Piurana clade, is being conducted. Interspecific hybrids are being characterized for resistance and agronomic performance.
- Crossing barriers, specifically self-incompatibility in diploid native potatoes (S. phureja, S. stenotomum, S. goniocalyx) and wild diploid (S. chiquidenum, S. paucissectum) and inter-specific pollen rejection from these species, are researched.
- Genotype by environment (GxE) interactions and stability for the yield and quality of 20 advanced CIP clones with resistance to virus (PVY / PVX) and late blight is investigated in contrasting environments in Peru. Additionally, a regional platform for GxE performance prediction with the use of GIS has been initiated using common sets of materials.
- An online training series for virus resistance screening has been developed. It can be accessed through: http://research.cip.cgiar.org/confluence/display/redlatinpapa/Videos.
- Special efforts are made to reach pockets of poverty marginal and isolated areas. Participatory Varietal Selection (PVS) is actively promoted and implemented by LatinPapa Network partners in Costa Rica, Colombia, Ecuador, Peru, Bolivia and Argentina.
- Together with Alianza Cambio Andina the M&B-trial design for Participatory Varietal Selection (PVS) is being consolidated with 5 R&D consortiums in Peru and 2 consortiums in Colombia. Decentralized clonal selection through these consortiums involves farmer communities, municipalities, NGO´s, farmer cooperatives, among others.
- The International Cooperators Guide (ICG; Bonierbale et al., 2007) has been updated and translated to Spanish. Publication is foreseen for 2009. In the meanwhile the LatinPapa website has a special section on protocols where manual can be downloaded.
- A series of regional training events concerning techniques and procedures have been organized, including a workshop about GxE analysis in Argentina, a sensory evaluation and cytogenetics workshop in Peru, among others.

Module 2 (dissemination)

- An online catalogue of advanced CIP clones has been designed and published on the LatinPapa webpage. Annually an updated catalogue in also distributed on CD-rom. See: https://research.cip.cgiar.org/redlatinpapa/pages/home.php?lg=en. Currently network members in Ecuador and Colombia are developing catalogues of advanced clones from their breeding programs.
- Some national programs have published variety catalogues of. For example, EMBRAPA-Brazil. INIA-Peru is close to publishing a commercial variety catalogue with 12 of their most recent varieties. A catalogue

of CIP varieties has also been developed. **http://www.cpact.embrapa.br/publicacoes/download/documentos/documento_247.pdf**

- Demonstration trials with new varieties have been implemented by several network members. These demonstration trials are generally installed at highly visible and frequently visited sites.
- Public Private Partnership initiatives as a way to disseminate new potato varieties are being implemented in several countries, e.g. in Peru between INIA and *Plaza Vea* supermarkets, in Costa Rica between INTA and Walmart supermarkets, and in Colombia between CORPOICA and McCain (see: Villamil *et al.*, 2008). Similar initiatives with development organizations also implemented, particularly in the Andean region.
- Another strategy used by some LatinPapa Network members, e.g. PROINPA Bolivia, is to promote new varieties at popular events: fairs, conferences and field trips.
- Under the section "documents of interest" the LatinPapa webpage offers some systematized experiences of dissemination from member institutions.

Module 3 (seed)

- The LatinPapa Network actively promotes aeroponics as an appropriate technology for pre-basic seed production. Production modules have been installed by INIA-Peru, INIAP-Ecuador and INTA-Argentina.
- The LatinPapa Network, recognizing that aeroponic seed production technology still needs to be fine-tuned, also promotes research on the production system. For example, a trial concerning the response of mini-tuber production of 10 clones under aeroponic systems in greenhouses in 2 contrasting environments in Peru started in early 2008 and is still ongoing. It is expected to reveal valuable insights into GxE interactions.
- An economic validation of different pre-basic seed production technologies is conducted comparing CIP´s aeroponics system, conventional peat-pot multiplication, CORPOICA´s and EMBRAPA´s hydroponics systems.
- A database with national seed laws from member countries has been published on the LatinPapa webpage. It also includes lists of seed providers of new varieties in each country. The aim is to have a single reference site with access to regional legislation so that comparisons can easily be made to stimulate adaptation towards functional seed laws. See: http://research.cip.cgiar.org/confluence/display/redlatinpapa/Semilleristas1
- The LatinPapa Network also actively aims to strengthen and diffuse adapted functional farmer seed system such as the system of internal control implemented by CONPAPA in Ecuador. A diffused-light seed storage system was implemented in Ecuador to strengthen the competitiveness of the farmer association. INIA is currently involved in stimulating replication of the successful Ecuadorian experience in Peru.
- EMBRAPA-Brazil published a video on pre-basic seed production systems with hydroponics.
- INTA-Argentina shared the experience of Autotrophic Hydroponics System with Chile, Bolivia, Ecuador, Colombia, Venezuela and Uruguay.
- INIAP Ecuador is validating the use of growth-stimulating microorganisms in aeroponics.

Module 4 (Information Systems)

A website of the Latinpapa Network has been designed and is continuously updated. See: http://www.cipotato.org/redlatinpapa/

Twice a year the InnovaPapa Bulletin is published. It informs about novel experiences and collaborative activities of LatinPapa Network members.

See: http://research.cip.cgiar.org/confluence/display/redlatinpapa/Boletin

- An information section with national variety release procedures has been included within the LatinPapa webpage. This allows network members to compare legal frameworks with the idea to make new variety release legislation more agile and less bureaucratic.
- Some of the national networks have also implemented their websites, e.g. the Red Patata: www.neiker.net/neiker/papata
- A common data platform for the future prediction of genotype by environmental adaptation is currently being developed by Latinpapa Network members. The initiative followed from the workshop "Stability Analysis and Interpretation of Results using AMMI, SREG and PLS and Diva-GIS".

Conclusions

The LatinPapa Network integrates potato breeders from National Agricultural Research Institutes (NARI), universities, private institutions and base organizations from 11 Latin American countries and Spain with the common objective to enhance the pro-poor impact of potato breeding through collaborative research on advanced potato germplasm, strategies for dissemination, seed systems and information management. The initiative formally started in early 2008 and has since actively promoted collaboration among its members.

Literature cited

Bastos, M.C., De Haan, S. and Bonierbale, M. 2008. Red iberoamericana de innovación en mejoramiento y diseminación de la papa - Red LatinPapa. pp. 160-161 In: M.F. Lucca (ed.), XXIII. Congreso de la Asociación Latinoamericana de la Papa., Seminario Latinoamericano de Uso y Comercialización de la Papa: memorias, Mar de Plata.

Bonierbale, M., De Haan, S. and Forbes, A. (eds.) 2007. Procedures for standard evaluation trials of advanced potato clones: an International cooperators guide. International Potato Center (CIP), Lima.

De Haan, S., Bonierbale, M., Bastos, M.C., Ñustez, C., Vilaro, F., Gabriel, J. and Ríos, D. 2008. Red iberoamericana de innovación en mejoramiento y diseminación de la papa (Red LatinPapa): una plataforma para combatir la pobreza rural en América Latina. pp. 15-18. In: E. Ritter and J.I. Ruiz de Galarreta (eds.), Avances en ciencia y desarrollo de la patata para una agricultura sostenible, Vitoria-Gasteiz.

Villamil, H., Caldiz, D., Mateus, J., Bonierbale, M. and De Haan, S. 2008. Desarrollo cooperativo de materiales avanzados del CIP en Colombia: el caso de la variedad NOVA CC. pp. 45-47. In: E. Ritter and J.I. Ruiz de Galarreta (eds.), Avances en ciencia y desarrollo de la patata para una agricultura sostenible, Vitoria-Gasteiz.