

Collaborative Crop Research in Action:

A study of the McKnight Foundation's Support for Andean
Grains Research and Development in Bolivia and Ecuador

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May 19, 2014

COLLABORATIVE
CROP RESEARCH
PROGRAM

THE MCKNIGHT FOUNDATION



Introduction to case study by The Collaborative Crop Research Program

In 2012 the Collaborative Crop Research Program of the McKnight Foundation decided to undertake a series of case studies to better understand the impact and lessons of their interventions and those of selected grantees over the years. The case study method was chosen as a way of combining qualitative and quantitative data in a utilization and learning format that would inform the program, grantee and larger community in order to learn and improve research for development outcomes going forward.

The Andean Grains case study is the first in the series and is an excellent example of how this approach can provide insightful evidence and analysis that informs various hypotheses about how best to undertake more relevant and rigorous research that ultimately allows small-scale farmers in the Andes to improve their livelihoods.

In the instance of this case study, the regional team from the program who administers Andean grants for the Foundation found the report to be a confirmation of the flexibility, support and capacity strengthening the CCRP provides as well as of the power of collaboration and participatory approaches. It also points to the need to more fully engage outside actors in the quinoa sector in Bolivia and the Andean grains sectors in Ecuador to better understand how these two research programs fit into the larger market and consumption trends. Furthermore, it reveals the need for more systematic project level data on the impact and reach of seed and other technologies.

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Abstract

The McKnight Foundation commissioned a utilization-focused, developmental evaluation of its support to Andean grains research and development (R&D) in Bolivia and Ecuador through the Collaborative Crop Research Program. Taking a systems perspective, the evaluation was designed to assess the development and results of the national Andean grains programs, assess the contributions of the CCRP to these programs, and formulate lessons for improving the national programs and future CCRP support. The evaluation concluded that, although most of the factors that influence Andean grains production and use are beyond the control of R&D programs, the country programs have made important contributions to innovation with Andean grains in the two countries. The programs have released new varieties, worked with farmers to improve seed quality, and identified new ways to manage pests with minimal use of chemical pesticides. They have generated and disseminated information on ways to improve production and diversify uses of quinoa, lupine, and amaranth. They have influenced public policies and, through improved relationships and networks involving economic actors and agricultural service providers, they have facilitated innovation processes and strengthened the capacity for innovation with Andean grains in the two countries. Since the production and marketing conditions for Andean grains are constantly changing, national programs need to develop sustainable R&D capacities to respond effectively to changing needs and opportunities. Developing effective capacities for networking and for brokering innovation processes is critical. Through its emphasis on systems change through collaborative research, knowledge sharing, and capacity building, the CCRP has made important contributions to developing such capacities in the two countries. A growing concern for the national programs is the need to develop sustainable financial strategies that would reduce their dependence on external donors as well as the national treasury.

Preface

The McKnight Foundation's Collaborative Crop Research Program (CCRP) has been operating for two decades. To better understand the program's contributions to change and to improve future grant making, the Foundation has commissioned a set of evaluation studies to assess the CCRP approach and the results in Africa and the Andean region of South America. The present report presents the findings of the Andean study, which focuses on the CCRP's support to Andean grains research and development (R&D) in Bolivia and Ecuador.

The Andean grains study has three objectives:

1. To assess the development and results of the Andean grains R&D programs in the two countries.
2. To assess the contributions of the CCRP to Andean grains R&D in the two countries.
3. To formulate lessons for improving the Andean grains programs as well as future CCRP support.

To guide information collection and analysis, specific evaluation questions were formulated for each of these objectives. The study results are presented in relation to each of these questions. While the initiative for conducting the study came from the foundation, the study was designed and carried out so as to also be of use to members of Andean grains programs in Bolivia and Ecuador. Hopefully, the report will also be of interest to others who wish to expand the role of

Andean grains or other neglected and underutilized crops in reducing poverty, improving food security, and conserving natural resources.

The evaluation approach taken to this study reflects systems thinking. The CCRP's work in the Andes is viewed as a systems change intervention that aims to bring about changes in national Andean grains R&D programs that, in turn, are expected to contribute to changes in the production and consumption of Andean grains, and ultimately to poverty reduction, food security, and conservation of natural resources. The study is concerned with numerous interacting and "entangled" systems, which include the CCRP, the national Andean grains programs, their host organizations, and the broader innovation and food systems that they form parts of and which they seek to influence.

This study is not an "impact evaluation" in the traditional sense. We do not seek to assess the *impacts* of the CCRP, or of the Andean grains programs, on distant socioeconomic variables such as rural welfare, food security, or natural resource conservation. In the spirit of contribution analysis (Mayne, 2013), we seek to understand the contributions of the CCRP to the capacity and performance of Andean grains R&D in Bolivia and Ecuador, and the contributions of these programs to changes in public perceptions, policies, and the production and use of Andean grains.

The study draws on four main sources of information: publications on Andean grains and information on the Internet; unpublished reports on the CCRP and the Andean grains programs; visits to field sites and key informant interviews with program stakeholders; and participatory review workshops conducted at the beginning and end of each country visit. Members of the CCRP and the country programs provided comments on a preliminary version of this report.

Many people have contributed to the planning and execution of this study. First and foremost, I would like to thank the many farm families, business people, researchers, and development professionals who met with me in Ecuador and Bolivia and gave generously of their time and knowledge of Andean grains production and utilization. Eduardo Peralta and the members of Ecuador's National Legumes and Andean Grains Program and Alejandro Bonifacio and the members of Bolivia's Quinoa Program made excellent arrangements for the country visits; prepared useful presentations and documentation on their work; organized my visits to research facilities, farming communities, and markets; were excellent hosts during my visits to Ecuador and Bolivia; responded to numerous requests for additional information and clarifications after the fieldwork; and provided detailed comments and suggestions for improving this report. The senior management teams of Ecuador's National Autonomous Institute for Agricultural Research (INIAP) and Bolivia's Foundation for Investigation and Promotion of Andean Products (PROINPA) actively supported the study and took the time from their busy schedules to meet with me and discuss their organizations' work and their views on Andean grains research and development. Claire Nicklin and Carlos Perez, respectively the Regional Representative and the Liaison Scientist of the CCRP in the Andes, provided abundant information and useful insights on the CCRP and its work in Ecuador and Bolivia. Claire also coordinated the overall study, greatly facilitating my work. The program's leadership team participated actively in planning the study and provided useful comments on a preliminary version of the final report.

1. The Andean Grains Programs

Andean grains: their nature and dynamics in the context of agricultural development

The Andean region of South America is one of the world's major centers of plant domestication. Indigenous peoples in the Andes domesticated a number of crops known as Andean grains, including quinoa (*Chenopodium quinoa*), amaranth (*Amaranthus caudatus*, *A. quitoensis*), lupin (*Lupinus mutabilis*), and kañiwa (*Chenopodium pallidicaule*). Prior to the Spanish conquest, these crops were highly prized for their rusticity, adaptation to highland growing conditions, and nutritional quality. However, during the Colonial and Republican eras, these crops were frequently disparaged as “food for Indians.” As other crops were introduced, the cultivation and consumption of Andean grains declined, and they practically disappeared from cities and many farming communities.

At present, Andean grains are still minor crops in most of the Andes. Nevertheless, growing interest in quinoa and amaranth, as healthy foods, and in lupines¹, as a tasty snack food and ingredient in modern dishes, is driving increases in their production and consumption throughout the Andes. There is strong external demand for quinoa, particularly organic quinoa, but limited production, and limited R&D to support such production. There is also strong international demand for organic amaranth, but extremely limited production and market development for this crop in Ecuador and elsewhere in the region. There is relatively strong domestic demand for lupines, a significant part of which is satisfied by Peruvian suppliers.

In Ecuador, quinoa and amaranth were important in the farming systems and diets of indigenous people in the highlands. However, their importance declined significantly in the colonial and republican times, and in many areas they have practically disappeared. Many farmers have lost both their amaranth native varieties and the practical knowledge associated with their cultivation. Recent international interest in these crops has stimulated local interest in their cultivation. A number of non-governmental organizations (NGOs) have begun to work with small farmers to expand cultivation and exportation of quinoa. While local quinoa consumption remains low, the introduction of processed quinoa products has stimulated local consumption somewhat. Market agents have received expressions of interest in amaranth, but have not been able to identify local sources of supply to satisfy the potential demand in international markets.

In Bolivia, quinoa has been an important crop and food source since the time when it was domesticated. It is one of the few crops that flourish in the cold and semi-arid conditions of this unique ecological region. Quinoa cultivation has always been most important in the southern *altiplano*, in the departments of Oruro and Potosi, around the Uyuini salt flat,² a region ranging from about 3,500 to over 4,000 meters above sea level. Here, a number of landraces (ecotypes) of *Quinoa Real* flourish and produce large grains that are preferred by both Bolivian and foreign consumers, and that fetch high prices on international markets. The strong demand for organic quinoa in Europe and other foreign markets over the past decade has unchained a “quinoa boom” in Bolivia's southern *altiplano* but also a rapid expansion of quinoa cultivation in new areas, both in the central and northern *altiplano* and in valleys at lower elevations.

¹ Lupin is known in Ecuador as “chocho”, in Peru and Bolivia as “tarwi” or “tarui”, and lupine or lupine bean in common English.

² The *Salar de Uyuni* is the world's largest salt flat (http://en.wikipedia.org/wiki/Salar_de_Uyuni).

In the traditional farming systems of the southern *altiplano*, few pests affected the quinoa crop, and farmers did not apply chemical pesticides. Quinoa was part of an agropastoral system that included llamas. The boom has also led to reduced crop rotation, fallowing, and llama herding, and intensification of production that has resulted in increased pest problems. These changes in farming practices appear to be leading, as well, to reduced soil fertility and increased wind erosion, and some observers fear that the quinoa boom is converting the southern *altiplano* into an unproductive “dust bowl” and jeopardizing the livelihoods of local people (Jacobsen, 2011). Such fears have been widely reported in news outlets, including *The Guardian* and *Mother Jones*. However, as Winkel and colleagues (2012) note, the environmental and dietary impacts of the quinoa boom are far less clear-cut, and clearly negative, than the initial reports have indicated.

The available quinoa statistics (Figures 1-3) indicate that Peru was the largest producer in the 1960s and Bolivia has been the dominant producer since then. Recently, estimated quinoa production has increased more rapidly in Peru than in Bolivia, and if the current trends continue, Peru will surpass Bolivia as the largest quinoa producer in the near future.³ Ecuador’s annual quinoa production has remained small – around 1,000 tons throughout the period. In both countries, the main force driving quinoa production has been change in the area harvested. Quinoa yields have generally fluctuated between 400kg and 1,000 kg / ha with no discernible trend, except in Peru where yields have been increasing since the 1990s.

Figure 1. Quinoa: Production by country (3-year moving averages)⁴



³ It is important to note, however, that an unrecorded and unknown, but presumably significant, amount of quinoa enters southern Peru each year from the Bolivian *altiplano*.

⁴ The source is FAOSTAT, the on-line data base of the FAO, which includes time series and cross sectional data relating to food and agriculture for 245 countries and territories from 1961 to the most recent year (accessed June 13, 2013). For Figures 1-9, FAOSTAT’s annual estimates were used to calculate and plot three-year moving averages. The years indicated on the horizontal axis of each figure corresponds to the mid-point of each three-year moving average.

Figure 2. Quinoa: Harvested area by country (3-year moving averages)



Figure 3. Quinoa: Yields by country (3-year moving averages)



Available quinoa trade statistics show the clear dominance of Bolivian exports and the dramatic run-up in the volume and especially the value of quinoa exports over the last decade. Since 2000, the volume of Bolivian quinoa exports has increased nearly 10 times and since 2005 the price has tripled (Figures 4-6).

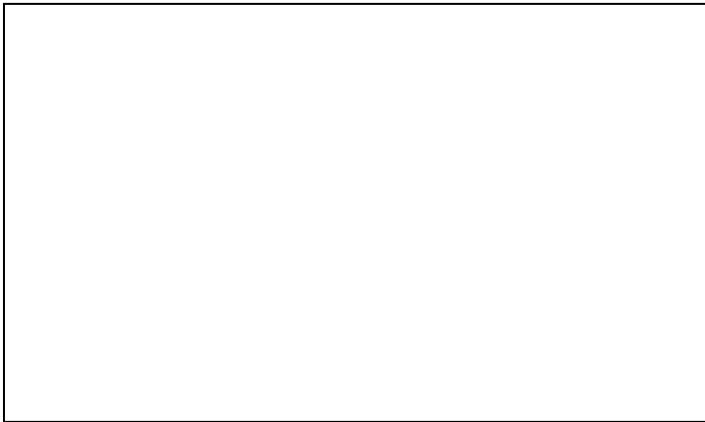
Figure 4. Quinoa: Volume of exports by country (3-year moving averages)



Figure 5. Value of exports by country (3-year moving averages)



Figure 6. Quinoa: Export price by country (3-year moving averages)



Available lupine statistics indicate that Ecuador was the leading lupine producer in the 1960s, but Peru's production has outstripped Ecuador's since then. Peruvian lupine production fell during the 1980s, when terrorism disrupted agricultural production, but has increased dramatically since the early 1990s. In Peru, lupine yields fell during the 1960s, 1970s and 1980s, and have recovered somewhat over the last two decades, to just over 1 t/ha. Ecuador's yields fell until the mid-1970s, then increased dramatically until the mid-1980s, and then fell again to around 500 kg/ha. In Bolivia, lupines are produced in the northern *altiplano* and in highland valleys. An unknown, but presumably significant, amount of Bolivia's lupines is exported to Peru and some are shipped to Ecuador. Recently lupine prices have increased in Bolivia, stimulating interest in cultivating this crop (Figures 7-9).

Figure 7: Lupin: Production by country (3-year moving averages)



Figure 8: Lupin: Harvested area by country (3-year moving averages)



Figure 9: Lupin: Yields by country (3-year moving averages)



“Our grandparents planted quinoa and other crops in August. But now the rains don’t come until November. Climate change is very real for us here.”

Elías Vargas, small farmer en Cachilaya, northern altiplano

“We are working with a product [quinoa] that has changed the lives of many people... But unfortunately many producers have a short – term mentality, and think, “I’d better get rich now or I never will.”

Paola Mejia, General Manager, CABOLQUI, La Paz

“Farmland isn’t bought or sold here; it belongs to the everyone in the community, but some people who left the community are now returning with money, and they want to grab all the land they can to grow quinoa. This upsets our way of life ... Those who live here have their quinoa and their llamas. But those who return don’t have llamas and don’t want them either. They just want to make money fast growing quinoa.”

Sandro López, CADEQUIR, Uyuni

“In my village there are only old people now. Once kids go to school in town they are not going to come back to the village to herd llamas. They want to apply what they have learned in some way... You can make money fast with quinoa, but not with llamas. You have to take care of a llama for four or five years, and if you don’t take good care, a wolf or a mountain lion will eat it... [Concerning yields] the key factor is rainfall. When it rains, you get good yields even on bad fields. But if it doesn’t rain, it doesn’t matter how good your seed is or how much fertilizer you put on; the yield will be bad.”

Receptionist, Hotel Girasoles, Uyuni

“Without realizing it, we have done a lot of damage... we have exterminated the llamas and alpacas... We are also eating fewer potatoes and less quinoa and more noodles and rice.... As fields are cultivated, the yields definitely fall over time. Fields that have been cultivated 20 or more years have smaller plants and lower yields.”

Wilder Yucra, Chacala, Uyuni

“The quinoa crop is a bit mysterious. How can it be grown in such arid areas?... But it isn’t true that quinoa consumption has dropped because more quinoa is exported. The truth is that quinoa production and sales have grown a lot, and that producers still keep part of their quinoa to eat... It’s important to realize that quinoa has never been consumed in the city, except on holidays like Christmas. We city people are never going to eat quinoa every day. And it’s also a lie that yields are falling dramatically... The agricultural frontier is being extended, but where is the desertification?”

David Soraide, Director Fundación AUTAPO, Oruro

“Quinoa is now a luxury. It’s no longer accessible to people with low incomes.”

Víctor Pacosillo, Owner and manager of a firm that exports quinoa, El Alto, Bolivia

Development of the national Andean Grains programs

Institutional setting of Andean grains’ research and development

In Bolivia, quinoa genetic breeding began in the Patacamaya Experiment Station in 1965, based on an agreement between OXFAM/FAO and the government of Bolivia (Gandarillas 1986). By the 1990s, a solid program had been developed within the newly established Bolivian Institute for Agricultural Technology (IBTA) that included germplasm collection, breeding, pest management, and agronomy. Over the years, IBTA released a number of new varieties of quinoa. In 1998, when Bolivia decentralized administrative responsibility for many of its public services and disbanded IBTA, the quinoa program was left without an institutional home. In 1999, the program was assimilated into the PROINPA Foundation. PROINPA⁵ took up the mandate for quinoa R&D, and over time, it reconstituted and further developed the program that earlier had

⁵ PROINPA started in 1989 as the continuation of as the defunct IBTAs Potato Research Program (Programa de Investigación de Papa) with technical and managerial support from the International Potato Center (CIP) and funding from the Swiss Agency for Development and Cooperation (SDC). In 1998 it became a private Foundation for the Promotion and Research of Andean Products (Fundación Promoción e Investigación de Productos Andinos), and expanded the range of crops it researched beyond potatoes (Gandarillas et al. 2007).

been implemented by IBTA. Since its inception, Andean grains R&D in PROINPA has focused on quinoa, with other crops, such as kañiwa and amaranth receiving minor attention.

PROINPA is an independent foundation dedicated to agricultural R&D in highland Bolivia. The fact that Bolivian program is hosted by a foundation is highly innovative in the Latin American context (Gandarillas et al. 2007). Established in 1989, PROINPA has its institutional roots in projects funded by the Swiss Agency for Development and Cooperation (SDC), which sought to establish a sustainable capacity for potato R&D in the country.

The McKnight Foundation's support to PROINPA's quinoa research started in 2001 with funding for the "Sustainable production of quinoa" project, a collaborative effort of researchers from PROINPA and Brigham Young University. The Foundation's support for quinoa research continues until the present time. The McKnight Foundation's support has been decisive for reconstituting and consolidating Bolivia's quinoa germplasm collection, and later for expanding the collection, characterizing and evaluating it, and developing protocols for the collection's conservation and management. It provided PROINPA's and Bolivia's core quinoa research funding until 2010 when the Bolivian government established the National Institute for Agricultural and Forestry Innovation (INIAF). At that time, responsibility for maintaining the national quinoa germplasm collection passed from PROINPA to INIAF, which also began the development of a comprehensive quinoa research program. However, development of the INIAF research program has been slow, and PROINPA continues to be the recognized leader in quinoa research in the country. Recently, PROINPA and INIAF signed a cooperative agreement for conducting R&D on quinoa, potato, and wheat.

In 1962, Ecuador established the National Agricultural Research Institute (INIAP) as a semi-autonomous national research institute attached to Ecuador's Ministry of Agriculture and with a core budget from the national treasury. INIAP has benefitted from a number of institutional strengthening loans from the Inter-American Development Bank and other multilateral and bilateral funding agencies. In recent years, agricultural development has not been a national priority, and resources for INIAP field operations need to be generated by programs through externally funded projects or the sale of products and services. Therefore, INIAP's Andean crop research activities rely significantly on external sources of funding.

INIAP did not carry out research on Andean grains until the late 1980s. At that time, work on lupin began in the Andean Crops Program, but this program was dismantled in the late 1990s, and work on lupin was transferred to INIAP's Legumes Program. Later, quinoa was added, and most recently amaranth. Until now, few universities or other organizations conduct research on Andean grains, and INIAP continues to be the lead organization in this field. The McKnight Foundation initial support for INIAP's "Lupin/quinoa" project dates from 2005 and continues until the present.

How have the programs evolved over time?

Both country programs are relatively small. Annually, PROINPA's quinoa program employs about 7.5 person-years of scientific staff, while INIAP's Andean grains program employ about 3.3

person-years. The Bolivian program has more highly trained researchers and attracts several students for thesis research each year, augmenting its research capacity.

Over the past decade, to expand its impacts and enhance its relevance, the Bolivian program has broadened its scope from germplasm collection and breeding to include integrated crop and pest management, diversification of uses of quinoa, and, most recently, soil conservation and natural resources management. Meanwhile, to bring its scope of activities in line with available resources, the Ecuadorian program has narrowed its focus over time.

In recent years, to improve the linkage of research with development efforts, to disseminate research results, and to achieve more widespread impacts, both programs have intensified their partnering and addressed issues beyond the farm level, along the market chain.

Bolivia's quinoa program has responded to the strong commercial demand for organically cultivated *Quinoa Real* and the threat of environmental degradation by moving aggressively into R&D aimed at improving food security, expanding the development and use of bio-inputs to manage quinoa pests and improve soil fertility, and re-introducing native shrubs to protect soils on the *altiplano* from wind erosion and to serve as hosts for beneficial insect populations. In contrast to the PROINPA program, INIAP's Andean grains program has not yet begun R&D work on organic cultivation methods. This reflects the institutional position of INIAP, which is skeptical of the feasibility of organic cultivation in Ecuadorian farming systems. Consequently, there is little communication between INIAP and organic producers and the NGOs that support them.

Throughout their histories, both PROINPA and INIAP programs have sought not only to improve cultivation but also to expand consumption of Andean grains. One very significant change is that, over time, both programs have become much more explicitly client-oriented, participatory, and systems oriented.

When the quinoa program was incorporated into PROINPA, beginning in 2000, it was guided by a traditional "Green Revolution" model of innovation that was centered on breeding and genetics (Vanloqueren and Baret, 2009). The initial priority was to reconstitute the germplasm collection, which would form the bedrock of the quinoa-breeding program.

Collaboration with Brigham Young University (BYU), financed in part by the McKnight Foundation, played a crucial role in characterization of the Bolivian germplasm collection and establishing a core quinoa collection based on agro-morphological characters, geographic origin, and molecular markers. Initially, PROINPA's quinoa genetic improvement program used Bolivian research facilities belonging to the Benson Institute of BYU, for research on drought tolerance and salt stress. The leader of Bolivia's Quinoa Program, Alejandro Bonifacio, obtained a Ph.D. degree from BYU, and Amalia Vargas completed a M.S. degree at BYU with a thesis on quinoa. BYU plant pathologists traveled to Bolivia to score segregating populations for mildew resistance and to collect fungal isolates from these populations. Work at BYU also aided breeding efforts in Bolivia by evaluation of starch content in quinoa germplasm and developing methods for using genetic markers to assist in selection of genetic lines with specific traits. Through work at BYU, a method was developed for reducing the moisture content of quinoa seeds for long-term storage.

As the germplasm collection became established and characterized, program priorities shifted to varietal improvement, seed production, and distribution; as well as to integrated crop and pest management and farmer training. When the production of organic quinoa for export has become a national priority, PROINPA responded by intensifying its work on integrated pest management and bio-inputs. Due to emerging environmental problems associated with the quinoa boom, the program's perspective has broadened from a focus on the quinoa crop in isolation, to understanding and improving quinoa cultivation in the context of local farming systems and ecologies. Currently, the program is grappling with issues of agro-ecological intensification, with particular attention to soil conservation. Its systems-oriented R&D work seeks to ensure that future expansion of quinoa production in the central and northern altiplano does not lead to environmental destruction.

"In the Central Altiplano, we want to avoid what happened in the South... When you work with living systems – with crops and their pests and diseases -- you must continuously be on guard for new problems and look for new solutions. The job is never done... To improve soils here, it's necessary to combine scientific information with local knowledge. Local people classify soils very differently from the way scientists usually do. Farmers on the altiplano generally classify soils by their capacity to retain water."

Alejandro Bonifacio, Plant Breeder and Leader of the Quinoa Program, PROINPA

For many years the PROINPA program carried out participatory research grounded in work with small groups of reference farmers. This approach was important for technology development but inappropriate for technology diffusion. Today PROINPA is, therefore, going beyond its traditional work with farmers. Its emphasis has shifted to working with NGOs and other development-oriented organizations to expand the use of research results and promote farmer innovation, through an initiative known as "scaling up" ("escalamiento"). It has also begun to address technical issues that emerge throughout the market chains processes (e.g., pest problems in storage, industrial quality of distinct quinoa ecotypes and varieties, and tracing the sources of pesticide residues in export shipments). Hence, whereas initially PROINPA viewed itself as a "research organization," increasingly it is functioning as a "service organization," that serves not only agricultural producers but also a broad range of stakeholders concerned with production, marketing, and utilization of quinoa and potatoes.

In Ecuador, INIAP's Andean grains program initially addressed a wide range of topics, including varietal improvement, seed systems, agro-industry, strengthening farmers' research capacity, and promotion of micro-enterprises. Since 2005, the program has reduced its work on agro-industry and micro-enterprises, and focused more on varietal improvement, integrated pest management (IPM), non-conventional seed systems, and promotion of consumption.

Initially, a traditional research-and-technology-transfer innovation model guided the program. Nonetheless, over time it has expanded the involvement of farmers and market-chain actors in its reviews, planning, and research operations. This is reflected in the use of Local Agricultural Research Committees (CIALs) in selection of varieties and in the involvement of stakeholders in annual program reviews. In its work in three parts of the highlands (communities in the provinces of Cotopaxi, Chimborazo, and Cañar), the program has applied an integrated approach for promoting both cultivation and consumption of Andean grains. Building on innovative work in Ecuador and elsewhere, the program has worked with community-based organizations to

develop non-conventional seed systems that can provide good-quality seed without resorting to the complex and costly procedures of formal seed certification systems, which have not proved feasible for minor crops such as the Andean grains (Mazon, Peralta and Rivera, 2012). Since the beginning, the Andean grains program has aggressively and successfully promoted the consumption of Andean grains, both at community level and on the broader national stage.

The Andean grains programs of Bolivia and Ecuador depend heavily on project funding, from national and (mainly) international funders. PROINPA finances a portion of its core costs from an endowment, but virtually all the operational expenses of its research programs, including salaries, are financed through projects based on external sources of funding. A small amount of resources are also generated through sale of products and services. In INIAP, researchers' salaries and expenses associated with basic infrastructure are paid from the public treasury, but virtually all expenses directly associated with research operations (e.g., transportation, inputs, labor, and use of equipment) must be paid from funds acquired through projects or (secondarily) through the sale of products or services.

Since the McKnight Foundation began supporting the Andean grains programs (2001 in Bolivia and 2005 in Ecuador), it has provided the most continuous long-term support of any funding agency. The Foundation has provided these programs with over half of their project funding over the same period (59% of total project funding in Bolivia and 54% in Ecuador).

Program personnel and facilities

PROINPA's quinoa program has a total of 12 technical staff members, including one individual with a PhD in genetics, six with master-of-science degrees, four agricultural engineers, and one technician. Six of these individuals work full-time for the program, and five work part-time. The program's total scientific staffing equals 7.45 person years.

INIAP's Andean grains program has a total of 6 technical staff members. Four of them have M.S. degrees and two are agricultural engineers. All these individuals work part-time on Andean grains, and the program's total scientific staffing amounts to 3.3 person years.

Each year, PROINPA staff members supervise a number of students working on M.S. theses, augmenting the research capacity of the program considerably. In recent years, INIAP has found it difficult to attract thesis students. All current members of the Ecuador's program are relatively senior. INIAP has difficulty attracting and retaining highly trained young professionals. In contrast, the PROINPA program has a more age-diverse staff, with young professionals assuming important roles in the program and providing better prospects for renewal of program staff over time.

PROINPA has a research center with about 20 hectares of land in Quipaquipani, near La Paz where they conduct quinoa research. Most of the program's research is conducted together with farmer collaborators. In addition to its headquartered at Quipaquipani, the program has offices in Oruro and Uyuni, in the Central and Southern *altiplano*. In Ecuador, the program conducts most of its field research on farmers' fields and on land at the Simon Rodriguez Technical Institute, because the Santa Catalina experimental station is not ideally suited for Andean grains research.

The fact that the Andean grains programs conduct most of their research on farms has the advantage of bringing researchers into frequent contact with farmers and the conditions under which they operate, and it helps them develop a deep knowledge of the diverse farming systems and marketing environments in which Andean grains are cultivated and utilized. On the other hand, the lack of dedicated research facilities limits the programs' ability to conduct some types of advanced research under carefully controlled conditions. It is worth mentioning that PROINPA's partner Brigham Young University does have controlled greenhouse conditions where they are doing drought -stress and salt-tolerance breeding work.

Partnerships

Multi-organizational collaboration is rare in Ecuador and Bolivia, and there are few examples of successful joint efforts to link agricultural research and development activities. For this reason, it is no surprise that, initially, both programs tended to work in isolation. However, over time, as the programs have pursued more client-oriented approaches and as demands have escalated for them to scale up results and demonstrate larger impacts, the programs have found it useful to strengthen their working relations with other service providers as well as with farmer organizations and market agents.

In Bolivia, three recent initiatives have helped link PROINPA with other service providers:

- A concerted effort by the Quinoa Program to scale up impacts (“escalamiento”)
- An effort to identify the source of pesticide residues in a quinoa shipment to Europe
- Collaboration in planning and execution of a visit to Bolivia of major quinoa buyers from around the world

In its efforts to “scale up” the use of its varieties and other research results, PROINPA negotiated collaborative agreements with several businesses and NGOs. In the second initiative, PROINPA worked with the four organizations that certify organic cultivation practices and with the country's main quinoa exporters to identify possible sources of pesticide residues and measure that could limit the possibility that pesticide-contaminated shipments of quinoa were certified as organic. In the third initiative, led by the Bolivian Chamber of Quinoa Exporters (Cabolqui), PROINPA staff members provided technical inputs and contacts for field visits, organized a visit to PROINPA's laboratories and plant for producing bio-inputs in Cochabamba, and accompanied the group throughout their visit to the country. The successful development of each of these activities required close work with a range of stakeholders, which led to expanded and strengthened working relations.

From 2005 to 2009, INIAP's Andean grains program worked with an NGO to integrate local Andean grains R&D efforts into the NGO's broader program for nutritional improvement and education. The results were disappointing, because the NGO did not prove to be committed to the joint effort, and it eventually withdrew from the area. Since that time, the program has worked directly with community-level organizations in three parts of the country, to improve the cultivation and processing Andean grains and expand consumption.

2. Results of the Andean grains programs

Traditionally, program planning and monitoring functions have been weak in agricultural research organizations in general, and evaluation has been especially weak (Horton and Borges-Andrade, 1999). Over time, due in part to the urging and support of the McKnight Foundation, the Andean grains programs have strengthened these functions considerably. PROINPA's Technical Manager has played a key role in strengthening planning, monitoring, and evaluation processes in that organization. In Ecuador, two significant improvements have included the formulation of more realistic program objectives and the initiation of annual review meetings for the program staff and stakeholders to review the year's accomplishments and identify areas for improvement.

In both programs, the elaboration of a "theory of change" (Vogel, 2012) has helped program staff members understand more clearly the various changes that would need to be brought about – by the program on its own or in collaboration with others – for the program's desired outcomes to be achieved, and to identify priorities for action.

Both the programs have produced a number of valuable products. They have also contributed to public awareness, public policies, innovation capacity, and to some extent to changes in production and use of Andean grains.

Products produced and services rendered

Both the programs have collected landraces and wild species of Andean grains and have developed ex situ germplasm collections. Bolivia has a full-fledged quinoa-breeding program – one of the few, and perhaps the most productive one, in the world. The Bolivian collection has nearly 3,200 quinoa accessions, 800 accessions of cañahua (*Chenopodium pallidicaule*), and between 12 and 224 accessions of 6 other Andean grains and legumes. PROINPA has a full-fledged quinoa-breeding program that has released 7 new varieties since 2003, during the period of McKnight support. The PROINPA program is now the most comprehensive and productive quinoa-breeding program in the world. The program also evaluates traditional quinoa varieties and has selected several promising ones for distribution to farmers. Most of these varieties are intended for use in the central and northern altiplano, but two new varieties have been selected for cultivation in the southern altiplano. The Bolivian program is now working on varieties that are adapted to growing conditions at lower-elevation in inter-Andean valleys. Additionally, the program now has 7 additional advanced lines that have resistance to mildew and are adapted to cultivation at lower elevations.

Between 2001 and 2010, PROINPA worked to characterize the germplasm (using agro-morphological and molecular variables), distribute promising germplasm to farmers, and develop a "nuclear germplasm collection" for use in genetic improvement. The support and collaboration of Brigham Young University has been critical, especially in mapping the quinoa genome, and in the development of methods for genetic-marker-assisted selection for specific traits, such as saponin content. In 2010, PROINPA turned the germplasm collection over to INIAF, which has the national mandate for germplasm collection. PROINPA maintains a nuclear collection for use in quinoa breeding.

Ecuador's program has about 600 quinoa accessions, 480 lupin accessions, and 434 amaranth accessions. The Ecuadorian program has not released newly bred varieties, but has identified and recommended to farmers varieties that have been selected from existing genetic materials. Varietal selection has been led by geneticists but has been done with the active involvement of farmer collaborators. To date, the Ecuadorian program has named and recommended 5 quinoa varieties – one during the period of McKnight support and four previously. Similarly, it has recommended 2 lupine varieties – 1 with McKnight support – and 1 variety of amaranth. A quinoa-breeding program is being established and expects to begin releasing new varieties in the near future. Over the last few years, with the support from PROINPA, INIA-Chile breeders and the McKnight Foundation, INIAP has started a quinoa- and lupin breeding program, and it expects to begin releasing new varieties in the near future. Has established quinoa and lupin breeding program because of project.

Both programs have also worked to produce seed, to improve the quality of farmers' planting material and to disseminate improved crop varieties. Ecuador's work with non-conventional seed systems is particularly interesting and may have applications in other countries. PROINPA was among the first suppliers of certified organic quinoa seed, and continues to produce high-quality quinoa seed, including certified, in collaboration with small-scale producers. According to PROINPA reports, since 2002, Bolivia's Quinoa Program and farmer collaborators have produced about 30 tons of improved quinoa seed that was distributed to farmers in several regional markets and more recently through collaborating NGOs in efforts to scale up the use of new varieties and better-quality seeds. According to INIAP records, since 2005, Ecuador's Legumes and Andean Grains Program and its farmer collaborators have produced 5.9 tons of quinoa seeds, 21.3 tons of lupin seed, and 285 kg of amaranth seed.

PROINPA has a specialized team working on integrated pest management (IPM) that has gathered and systematized basic information on quinoa pests – beginning with the taxonomic identification of the main pests, study of the life cycle of the insects during the cropping season and fallow periods. In Ecuador, McKnight Foundation's funding has allowed the University of Greenwich's Natural Resources Institute (NRI) to support study at INIAP on lupin pests.

Tables 2 and 3 present a summary of the most important products produced and services rendered by the two programs.

Table 2. PROINPA's main Andean grains products produced and services rendered

Germplasm collection, conservation and utilization:

- Rescue of IBTA's quinoa germplasm collection (1999-2000), which was in danger of being lost
- Consolidation, *ex situ* conservation, evaluation, and utilization of the "National Germplasm Bank for Andean Grains" (2001 - 2010)
 - Development of protocols for collecting germplasm
 - Agro-morphological, molecular, and nutritional, and agro-industrial characterization of the collection
 - Development of a protocol for long-term storage of accessions
 - Promotion of the "National Germplasm Bank for Andean Grains"
 - Distribution of promising accessions to farmers
 - Development of a "nuclear germplasm collection" and its use for breeding
- Delivery of the "National Germplasm Bank for Andean Grains" to INIAF (2010) after 10 years of building up and conserving the germplasm collection
- Continued use of the nuclear collection for breeding (2010+)
- In situ conservation of quinoa genetic diversity (2010+)
- Publication of catalogues of the ecotypes of Quinoa Real (2003 and 2012)

Breeding program

- Development of one of the most advanced quinoa breeding program in the world (late 1960s - present)
- 14 new varieties released by IBTA (1970 - 1988)
- 7 new varieties released by PROINPA (2003 - 2011) (mainly adapted to growing conditions in Bolivia's north and central altiplano, some adapted to cultivation in lower valleys)
- 7 advanced lines with resistance to mildew and adapted to cultivation in lower-elevation areas

Seed produced and distributed:

- 30 tons of seed produced and distributed in the northern and central altiplano since 2002. They now represent an estimated 60% and 75% of the cultivated area, respectively.

Integrated pest management

- Basic information on main insect pests, including scientific identification, life cycles, and natural enemies
- Management options (including pheromones and eco-insecticides) identified or developed, tested, and combined in a strategy for "ecological pest management"
- Development, with US and Dutch partners, of pheromones for the quinoa armyworm, and associated traps and guidelines for their use, now applied on 8,000 ha in the southern *altiplano*

Inputs

- Development, with colleagues in PROINPA, bio-inputs for quinoa cultivation that are now used on 10,000 ha in the southern *altiplano*.
- Small-scale equipment for threshing and cleaning grain, widely used by farmers.

Information disseminated:

- *Topics covered:* Improved varieties, quality seed, EPM, harvesting and post-harvest technology, utilization, recipes,
- *Form of distribution:* FFS; training courses; field days; participation in scientific, development and public conferences and fairs; partnerships for scaling up, with development organizations; sales of seed; pheromones, and bio-inputs.

Table 3. INIAP'S main Andean grains products produced and services rendered

<p><i>Germplasm collection, conservation, and evaluation:</i></p> <ul style="list-style-type: none">• 608 quinoa accessions• 481 lupine accessions• 434 amaranth accessions <p><i>Breeding and varietal selection:</i></p> <ul style="list-style-type: none">• 5 quinoa varieties selected (1 with McKnight support)• 2 lupine varieties selected (1 with McKnight support)• 1 amaranth variety selected <p><i>Integrated pest management</i></p> <ul style="list-style-type: none">• Study of the lifecycle of a major lupin pest (<i>Delia platura</i>) and estimation of damage caused <p><i>Seed production, 2005-2012:</i></p> <ul style="list-style-type: none">• Quinoa: 5,934 kg• Lupine: 21,280 kg• Amaranth: 285 kg <p><i>Information dissemination:</i></p> <ul style="list-style-type: none">• <i>Topics covered:</i> Varieties and cultivars, non-conventional seed systems, agronomic practices, harvesting and post-harvest technology, nutritional composition and quality, dietary uses• <i>Form of distribution:</i> Recommendations, guidelines, extension bulletins, recipe books, print and electronic publications on INIAP website, radio spots, short courses, workshops, conferences, responses to individual requests.
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To support farmers to produce quinoa without resorting to chemical fertilizers or pesticides, PROINPA has established a private firm, Biotop, which markets bio-inputs to support the organic cultivation of quinoa and other crops. The bio-inputs encompass use of fungi, bacteria, plant substances, pheromones and other natural ingredients to strengthen plants, improve soil fertility, and manage insect pests. Pheromones are produced in partnership with a Dutch commercial firm. In 2011-2012, Biotop marketed pheromones and other bio-inputs that were used on 8,000 hectares of quinoa, i.e. approximately 15% of the area planted to quinoa in the southern *altiplano*. Biotop is currently the principal commercial source of bio-inputs in Bolivia. The successful development and widespread application of bio-inputs in Bolivia reflects positively on PROINPA's foresight and proactive approach in responding to emerging demands.

Two topics that stand out in PROINPA publications are germplasm and eco-management of pests. A catalogue of the quinoa collection in the National Bank of Andean Grains was published in 2001. Ethno-botanical catalogues for Bolivian Quinoa Real were published in 2003 and 2012. In recent years, a number of fliers and extension-type bulletins have been published on the use of pheromones and traps for monitoring quinoa moth (*ticona*) populations, disrupting mating, and reducing populations.

Contributions to networking, innovation, and policies

Traditionally, members of the Andean grains programs, like other professionals in PROINPA and INIAP, played the role of researcher-expert. Recently, they are also playing the role of “networker” and “innovation broker” (Table 4). PROINPA has worked with traders, processors, and firms that certify organic crops to find ways to avoid pesticide contamination in quinoa exports. PROINPA has also worked with the Chamber of Bolivian Quinoa Exporters to facilitate communication among market chain actors and agricultural service providers, to articulate demands for innovation, and to foster innovation processes. PROINPA has also used a promising new vehicle for dissemination of technical information in Bolivia whereby it has worked with eight development organizations. Whereas, previously, the program usually worked directly with farmers and their organizations, in this initiative, they are training NGO personnel who later were responsible for the front line work with farmers. Last but not least, PROINPA is supporting the government’s efforts to define standards for organic production of quinoa and other crops. Government officials also frequently consult the program’s members on technical issues, and PROINPA prepared the scientific paper that supported the government’s proposal to the United Nations to declare 2013 as the International Year of Quinoa.

“PROINPA has done a lot of research and has developed many new technologies. But these are useless unless the people who need them use them. Unfortunately, there has been a lot of ‘research’ but little ‘innovation’ on farms... Time is short. Quinoa has many problems that need solutions now.”

Paola Mejia, General Manager, CABOLQUI

“PROINPA’s research and bio-inputs have been very important for us.... But we want PROINPA to produce results quicker. We need to shorten the time needed for research to yield practical results.”

Sandro Lopez, CADEQUIR, Uyuni

“We now see more clearly how important it is for research to produce tangible products. We also see the importance of working on a large scale. Before, we thought we should continue to work on a small scale until we had determined the superiority of a new technology. Now we see the importance of beginning to work earlier at a large scale [to determine the feasibility and performance of research results under real-life conditions].”

Member of the Quinoa Program, Bolivia

INIAP has worked with a nascent association of Ecuadorian quinoa exporters, to help consolidate the organization. INIAP’s promotional campaigns on the virtues of cultivating and consuming quinoa, amaranth, and lupine – including radio spots, recipe books, workshops to demonstrate diverse food preparations, and participation in conference and fairs – appear to have stimulated public interest in Andean grains as healthy foods. In the policy sphere, program members have contributed to development of a new law and the accompanying regulations that recognize and promote the development of non-conventional seed systems, which in many cases are more appropriate for small farmers growing Andean grains. They have also provided technical inputs for the development of the government’s quality norms and standards for products based on Andean grains. INIAP’s support to networking and policy development is reviewed in Table 5.

Table 4. PROINPA's contributions to networking, innovation, and policies

Networking and innovation brokerage:

Program members have:

- Led a participatory study to improve “traceability” throughout the quinoa market chain, in order to ensure high product quality, food safety, and application of norms for certified organic quinoa cultivation and handling
- Participated actively in organizing the 2013 visit of main importers of Bolivian quinoa from around the world
- Participated actively in the recent development of a mutual fund for financing quinoa production in Bolivia

Public awareness

- Participation in fairs and exhibitions and dissemination of information on the nutritional value of quinoa and on innovative uses and preparations has contributed to renewed interest in quinoa.

Public policies

- Preparation of the technical document for the International Year of Quinoa.
- Contributed in development of quality norms and standards for organic products, including quinoa.

Contributions to innovation capacity

- Through the traceability study, PROINPA has helped to strengthen relations among producers, traders, processors, and others involved in the quinoa market chain, and also with external service providers (e.g., organizations involved in certification, research, and development activities)
- A number of partnerships have been established with development and commercial organizations to scale up use of new technologies
- Provided leadership in development of pheromones, eco-insecticides, and other bio-inputs and support for production of bio-inputs in PROINPA's Cochabamba plant.
- Supervision of M.S. theses by program staff members has strengthened students' appreciation of the importance of linking research to practical problems and illustrated practical ways to do so.
- Through participation in such projects as NUSIFAD, program members have helped link up researchers, development organizations, farming communities, and entrepreneurs in the quinoa market chain.

Table 5. INIAP's contributions to networking, innovation, and policies

<p><i>Networking and innovation brokerage:</i></p> <p>Program members have:</p> <ul style="list-style-type: none">• Worked with community leaders to link with service providers, donors, and markets• Communication via Internet with the network of “Friends of Andean grains”• Helped link traders and processors to possible sources of supply of Andean grains• Helped to strengthen nascent association of quinoa exporters and facilitate technical and institution innovation processes <p><i>Novel R&D approaches:</i></p> <ul style="list-style-type: none">• Model for non-conventional seed systems• Model for integrated production-and-consumption intervention <p><i>Public awareness</i></p> <ul style="list-style-type: none">• Promotional campaigns on the virtues of cultivating and consuming Andean grains – including radio spots, recipe books, workshops on food preparation, and participation in conferences and fairs – have helped shift public opinion in favor of Andean grains.• The Fourth World Congress on Quinoa, the International Symposium on Andean Grains, and other activities associated with the International Year of Quinoa, led or facilitated by the Andean grains program, are raising the public profile of Andean grains. <p><i>Public policies</i></p> <p>Program members have participated in development of:</p> <ul style="list-style-type: none">• A new law and regulations on seeds, agro-ecology, and agro-biodiversity• Quality norms and standards for products based on Andean grains

INIAP has made especially effective use of radio spots on local and national radio stations, which promote the cultivation and consumption of Andean grains. The program has also contributed to a series of widely disseminated recipe books, co-published by Nestle and INIAP, which include recipes employing Andean grains (Nestle, 2012). Another innovative form of information dissemination has been the co-publication with a farmer organization of experiences and approaches for non-traditional seed systems for Andean grains (CORPOPURWA, 2011). All the program's publications are available on INIAP's website.

The Andean grains programs have developed and applied novel R&D approaches that are at different stages of systematization and could be of potential use in other settings. Perhaps most notable are the following approaches:

- An integrated approach for promotion of Andean grains cultivation and consumption, developed by INIAP
- A model for non-conventional seed systems developed by INIAP
- A model for working with development organizations to scale up the use of research results, developed by PROINPA
- A farming / landscape system approach centered on quinoa, which employs native vegetation (legumes, shrubs, and pastures) in establishing multi-purpose strips as well as multi-cropping, developed by PROINPA

Public awareness and policy influence

In Ecuador, INIAP's promotional campaigns on the virtues of cultivating and consuming Andean grains – including radio spots, recipe books, training workshops on preparation of quinoa-based foods, and participation in conferences and fairs – appear to have helped shift public opinion in favor of Andean grains. In the policy sphere, program members have participated in development of a new law and regulations promoting, for the first time, the use of non-conventional seed systems. They have also provided technical inputs for the development of quality norms and standards for products based on Andean grains.

In Bolivia, participation of program members in fairs and exhibitions and dissemination of information on the nutritional value of quinoa and on innovative uses and preparations appears to have contributed somewhat to renewed interest in domestic quinoa consumption. As an independent foundation, PROINPA has not often been invited to work with governmental agencies on policy issues. However, the program's members are frequently consulted by government officials on technical issues, and notably, PROINPA was invited to prepare the scientific paper that supported the proposal of the Bolivian Government to the United Nations to declare 2013 as the International Year of Quinoa.⁶ Recently, INIAF has invited PROINPA to form an alliance for conducting R&D programs for quinoa, potatoes, and wheat. The programs are scheduled to begin operation in the second half of 2013.

Lessons learned

Lessons for national Andean grains programs

1. Most of the factors that influence Andean grains production and use are beyond the control of R&D programs. Programs need to continuously assess their operating environment and concentrate on areas where they can make the greatest contribution.
2. The multi-pronged, multi-level, "opportunistic" R&D approaches used by the Bolivian and Ecuadorian programs is appropriate for intervening in complex systems, such as those of Andean grains production and use.
3. In some cases – but by no means all – the Andean grains programs have played important roles in facilitating innovation processes. Successful cases should be documented and assessed, in order to learn lessons that can improve future R&D work.
4. Production and marketing conditions for Andean grains are constantly changing. R&D programs need the capacity to respond effectively to changing needs and opportunities.
5. There are no "universal solutions" to the problems of producers, market agents, or consumers. Research should look for "complementary alternatives" and options that can be adopted and adapted by users to fit local conditions and changing circumstances.
6. Collaborative approaches, good working relationships, frequent interactions, and alliances have been essential for capturing research demands and for promoting the use of research products.
7. Adaptive management that combines diagnostic work, frequent review, and subsequent adjustment of implementation plans, is an appropriate management approach for Andean grains programs.

⁶ The official website of the International Year of Quinoa is at: <http://www.fao.org/quinoa-2013>.

Lessons for the CCRP

1. Members of the national Andean grains programs value the CCRP's commitment to capacity building, its flexibility and openness to new ideas, the intensive interactions between project teams and the CCRP regional team, the continuity of the CCRP's support, and the co-development of priorities, programs, and results.
2. The CCRP approach seems to be well aligned with the needs and possibilities of the Andean grains programs, and program members have few suggestions for improvement.
3. A major concern of the Andean grains programs is the development of sustainable financing strategies, which would rely less on funding from external donors. Support for developing such strategies should be a priority for the CCRP.
4. Another priority of the CCRP should be support the systematic evaluation of the collaborative approaches used by the Andean grains programs, to facilitate learning and program improvement, and to gauge the potential utility of similar approaches in other settings.
5. Greater CCRP encouragement and support for the presentation & publication of research results and lessons would be useful for the national programs.
6. Members of the project teams consider the "regional CoP" to be very valuable for several reasons. However, it does not appear to function as a traditional Community of Practice, with frequent, spontaneous interactions among the members. It might be useful for the members of the country project teams, together with the CCRP Regional Team, to reflect on experiences with the CoP and to experiment with options for strengthening knowledge sharing and collective action among the project teams.

3. The CCRP Approach to Supporting Andean grains R&D

The McKnight Foundation's Collaborative Crop Research Program

The McKnight Foundation assists nonprofit organizations and public agencies to improve the quality of life for all people, particularly those in need. Through grant-making, collaboration, and support for strategic policy reform, the foundation seeks to build and maintain vibrant communities, enrich people's lives, protect the natural environment, and promote research in selected fields. With assets of around \$ 2 billion, the foundation gives about \$91 million in grants annually. About one quarter of the amount of the foundation's grants supports improvements in rural livelihoods and food security in developing countries.

The Foundation began funding international crop research in 1983 with a Plant Biology program. The Collaborative Crop Research Program (CCRP) began in 1993 with a budget of \$12 million for six years. In 2000, the Foundation committed another \$41.5 million over nine years. In 2008, the Foundation committed \$47 million over ten years, and the CCRP also received \$26.7 million from the Bill & Melinda Gates Foundation, to be used over five years. This funding allowed expansion of grant making in Africa and provision of regional support and non-grant assistance.

The mission of the CCRP is to support smallholder farmers working under risky and resource-limited conditions to improve their efficiency and resilience through the flexible application of ecological principles to improve their production, diets, and livelihoods. CCRP grant making

reflects five guiding values related to innovation, continuous learning, balance of research and development, respect for culture and the environment, and mutual respect.

The CCRP supports clusters of projects in Eastern and Southern Africa, West Africa, and the Andes. In each region, it brings grantees together to operate as a Community of Practice (CoP) that collectively supports agro-ecological intensification (AEI). The CCRP approach promotes AEI in local farming systems, by building local capacity and promoting integrated interventions that address production, nutritional, and environmental goals in locally appropriate ways. In each region, the CoP targets constraints to food and nutritional security through applied natural and social science research related to specific crops and value chains. The research agenda is refined over time to contribute to AEI in ways that promote better livelihoods, sustainability, and nutrition. CoPs aim to strengthen the capacity of R&D organizations to generate knowledge and facilitate innovation processes that contribute to agricultural innovation, farmers' food security, and family well-being. They seek to foster the use of collaborative approaches that reinforce local innovation capacity and collective action, and they emphasize the importance of understanding local context, harnessing AEI principles to inform local change, and then effecting change at scale through multiple pathways.

Regional teams translate the program's values and principles into practice in several ways, including the following:

- Strategic grant-making in support of a regional strategy
- Project inception periods that provide time for refining project plans
- Regular interaction with grantees through revision of annual reports, site visits and annual meetings
- Annual regional meetings that bring grantees together to interact with one another, with the regional team, and with external resource persons
- Training and technical assistance, which may be initiated either by grantees or by the regional team
- Providing support for improving the research methods used by grantees, provided by statisticians from Reading University.
- Use of "integrated monitoring, evaluation and planning" (IMEP) approaches that foster learning and program improvement

Evolution of the CCRP support

The CCRP approach has evolved considerably over time in the Andean region. When the first projects (including Bolivia's quinoa project) were formulated and approved in 2001, they reflected a traditional research-centered model of innovation. The first phase of McKnight support for quinoa R&D in Bolivia focused on reconstituting the quinoa germplasm collection and its use in breeding. The project was a collaborative initiative involving the PROINPA Foundation and Brigham Young University (BYU). The role of BYU in supporting PROINPA's work was central to the project design. The principal scientists in PROINPA and BYU signed the project contract and had considerable independence in decision-making, together with the McKnight foundation's representative. There was little dialogue between the project team and the foundation, except during project preparation and infrequent site visits. During this phase, according to members of the quinoa program, the foundation acted like a "traditional donor."

During the second phase of support for the Bolivian program, and when support for Ecuador's Andean grains R&D began, the Foundation posted a representative with a development background in the region (in Quito), and a scientific director based at Cornell University. The emphasis was on applied research and cross-sector collaboration. An Andean community of practice was established for grantees in the region. In 2007 the regional teams of the CCRP (3 in Africa and 1 in the Andes) were reorganized around a Liaison Scientist and a Regional Representative, supported by a specialist in statistics. An anthropologist (in the USA) joined the regional team as Liaison Scientist, and a statistician based at the University of Reading in the U.K., provided grantees with support in research methods and statistics. The CCRP regional team began to emphasize capacity building and social- and institutional innovation. Communication between the CCRP and the project teams became more frequent and substantive, as well as communication among project teams. Since 2005, project teams in the region have met annually as a "community of practice" (CoP), to review progress with each project, share knowledge and experiences, and discuss a topic of general interest, such as indigenous knowledge, non-conventional seed systems, and participatory monitoring and evaluation.

In the past seven years, the Foundation has stressed linking explicitly research with development processes and improving programs on the basis of lessons learned from experience, in order to ensure that programs produce useful results that benefit large number of poor people. To this end, the regional team has worked with local project teams to prepare "theories of change" for each project and to implement a system for "integrated monitoring, evaluation and planning" (IMEP) (CCRP-Andes, 2011). The Foundation has encouraged project teams to go beyond a narrow focus on specific production constraints and seek ways to improve the systems in which Andean grains are produced, marketed, and consumed. The Foundation's support has helped to legitimize research and evidence analysis as foundations for sound development practice. It has supported innovation and biological and social experimentation as components in the development of collaborative strategies for linking research and development initiatives, achieving large-scale impacts, and contributing to global knowledge via the production of "public goods."

The McKnight Foundation has contributed significantly to the capacity of the Andean grains programs in Bolivia and Ecuador. Had it not been for the McKnight Foundation's support, it is likely that Andean grains R&D would be a shadow of its current presence in the two countries. PROINPA would not have a quinoa program and it is unlikely that INIAP would be doing any research on quinoa or amaranth. PROINPA leaders state emphatically that without the foundation's support, PROINPA would not have a quinoa program. CCRP support has also helped to legitimize R&D work with Andean grains in both countries, and it has helped the host institutions establish their current position of leadership in Andean grains in the R&D world.

The CCRP has contributed to individuals' capacities by providing opportunities for short-term professional training, advanced-degree education, networking, and knowledge sharing among professionals from different organizations and countries. The CCRP has also contributed to the capacity and performance of the Andean grains programs by encouraging and providing resources for them to improve planning, program formulation, and learning from periodic reviews; to work with other development partners in scaling up activities; and to serve as

information hubs and innovation brokers that stimulate and facilitate innovation processes with Andean grains.

Program members greatly appreciate the flexibility of the CCRP's project management during implementation. Resources have been made available, on flexible terms, for operations, consultancies, and training. In Ecuador, the flexibility of disbursements is especially appreciated because of frequent delays in the availability of funding from the government, which can disrupt field operations and cause the failure of experiments. Recently the CCRP adopted an approach that recognizes that no plan is perfect, and so allows for projects to experiment, correct, adapt and refine project plans in "inception periods" that range from a few months to one year after the project funding is approved. This approach allows for flexibility, innovativeness and freedom to try, make mistakes and learn from the experience, all of which are greatly appreciated.

"A unique, and very important, feature of the McKnight foundation's support is its openness and flexibility. This allows projects to adapt over time and focus better on real needs. The foundation's flexibility allows project teams to adjust their plans and activities as they learn from the field. Most other donors insist that projects implement their original plans, without changes. This makes it impossible to learn and change .

Vivian Polar, biological and social scientist, PROINPA

"One unique feature of the McKnight foundation is its flexibility. This allows the projects to evolve over time. With other donors, after projects are planned, they are implemented, the final report is submitted, and they die."

Edson Gandarillas, Technical Director, PROINPA

"With the McKnight Foundation, we have improved our project review and planning very much... Our planning has become more realistic; it reflects not only our own aspirations but the views of farmers and others who we consult in planning and review meetings."

Member of Legumes and Andean Grains Program, Ecuador

"The McKnight foundation has an ample vision, but sees things up close too. Whereas other donors provide funding and then only want a final report, the McKnight foundation also wants to know why things went well, or why they didn't, and how to improve future work.

Amalia Vargas, Plant Breeder, PROINPA

"The McKnight Foundation understands research processes. They are not like other donors that make grants for short-term projects and expect quick results.... Additionally, no other donor provides money for genetic improvement for crops outside the CGIAR centers.

Member of the Quinoa Program, PROINPA

The Foundation has encouraged national Andean grains programs to work more actively with others – both economic actors and service providers – to promote innovation processes, and it has provided resources to support these activities. Consequently, trust has been built up among diverse stakeholders who are now working together more effectively. In Ecuador, the Andean

grains program has brokered innovation processes in three communities. Results have varied, depending on the local setting. In Bolivia, PROINPA's recent work with the Chamber of Exporters of Quinoa and Organic Products (CABOLQUI) and the Departmental Chamber for Quinoa Real in Potosi (CADEQUIR) and with development-oriented NGOs has also helped to build up trust and establish working relations. Expanding collaboration among economic actors and agricultural service-providers augers well for strengthened innovation capacities with Andean grains in the two countries. It would be useful to review these experiences with networking and innovation brokerage, to document the strategies that have been employed and identify factors that have influenced the results.

"Before we worked with the McKnight Foundation, each of us worked alone. With the foundation's support, we have developed a team and consolidated a program.

Member, Quinoa Program, PROINPA

"Thanks to the support of the McKnight foundation, PROINPA now has a quinoa program – not a project but an institutional program."

Alejandro Bonifacio, Leader of the Quinoa Program, PROINPA

"Before, it was thought that the knowledge of indigenous farmers was worthless. But now we value this knowledge. In our work with farmers, we learn a great deal and so do they. There's a constant exchange of knowledge."

Specialist in genetic resources, PROINPA

CCCRP contributions to program-level capacity and performance

In both countries, individuals identify four general ways in which their work with the CCRP has contributed to their personal capacity and performance. First, it has increased their motivation for achieving practical results and benefits for poor farmers. Second, it has improved their applied skills in technical aspects of their work (e.g., breeding and agronomy), and also in "new" areas such as research methods (surveys design, experimental design and statistical analysis, and qualitative research and analysis); participatory planning, monitoring, and evaluation; facilitation of meetings; geographical information systems; and partnering and innovation brokering, to better use research to promote innovation and socioeconomic development. Third, it has expanded their knowledge of useful in-country and regional experiences with R&D and innovation processes. And fourth, it has expanded their professional networks, within their own countries, across the region, and with some key individuals from outside the region. In the case of Bolivia, two individuals have obtained partial support from the CCRP to obtain Ph.D. degrees and three others have obtained M.S. degrees abroad. The two PhDs received their degrees at Brigham Young University, which has been an important strategic partner of the PROINPA breeding program. All four of these individuals returned to continue their work with PROINPA.

In both countries, the CCRP support provided a sense of legitimacy for the programs and a base from which they could go out and obtain additional project funding. The CCRP support in research methods helped both programs improve their program planning, research protocols, data analysis, and reporting, contributing to the quality of research designs and results. The

emphasis on partnering with development organizations, the work with IMEP, development of theories of change, and the emphasis on achieving concrete results at community level have contributed to the “impact orientation” of the programs, the relevance of the research, and the outcomes achieved.

“The contributions of the McKnight foundation to PROINPA have been fundamental. Without the foundation, there simply would be no quinoa program. Nor would there be a research center at Quipaquipani. The continuity of the foundation’s support has been essential for the continuity of quinoa research. Moreover, without the security that the foundation’s support has given us, we would not have been able to develop the other projects that make up the program today.”

Edson Gandarillas, Technical Director, PROINPA

The Foundation’s support allowed the reconstitution and further development of Bolivia’s “National Germplasm Bank for Andean Crops” and the development of a “Nuclear Germplasm Collection” for use in plant breeding, and it ensured the continuation of the quinoa program over the past 12 years. An additional contribution highlighted in Bolivia is encouragement and support for experimentation in emerging fields, such as use of genetic markers in breeding, development and use of pheromones and bio-inputs in organic cultivation, and re-establishment of native plants for soil conservation in the southern *altiplano*. Finally, in Bolivia the CCRP has provided the motivation and support needed for PROINPA to develop a number of inter-organizational collaborations to scale up innovation processes and results.

Without the support from the Foundation, PROINPA would not have had the resources to establish a quinoa program, or to consolidate the germplasm collection, which currently is the most important collection of quinoa germplasm in the world. In Bolivia, the CCRP support has allowed PROINPA to establish itself as the leader in quinoa research in Bolivia and as one of the leading research programs in this field internationally. It has also allowed PROINPA to work with leading R&D professionals and institutes around the world, in such areas as the use of genetic markers in quinoa breeding and development of pheromones for monitoring and control of quinoa pest populations. In Ecuador, CCRP support has ensured the continuity of Andean grains R&D within INIAP, and has helped to legitimize the use of collaborative and systems-oriented R&D approaches.

Broader system-level contributions

In Bolivia, CCRP support has helped strengthen the role of PROINPA as the leader in quinoa research and also as a facilitator of interactions and partnerships that lead to real-world changes in quinoa production, marketing, and consumption. A recent initiative to trace potential sources of pesticide contamination in shipments of “organic quinoa” and improve quality assurance in the future has helped improve inter-organizational relations. Distrust and competitiveness continue to characterize the institutional setting, but relations are improving, thanks in part to the Foundation’s encouragement and support for PROINPA to engage with a broader range of partners in addressing emerging issues facing. CCRP support has also helped to strengthen links between Bolivian researchers and leading researchers around the world, which have already led to practical improvements in quinoa cultivation.

In Ecuador, CCRP support has helped raise the institutional profile and enhance the legitimacy of INIAP's Andean grains program. Innovation capacity appears to have been strengthened in the communities that have partnered with the program. The partnership with the Simon Rodriguez Technical Institute, supported by the CCRP is contributing to the practical orientation of education in the institute. The program's dynamic networking, encouraged and supported by the Foundation is strengthening relations among public and private actors, with the Andean grains program serving as innovation broker.

"With the McKnight foundation, we have learned that we are one among many actors in a larger innovation system, and we have learned to value alliances with other important actors."

Milton Pinto, Researcher, Genetic Resources, PROINPA

"We used to think that the only option was for us to work directly with farmers. But now we realize that we can work with other organizations that may be better equipped to reach large numbers of farmers. This is been an important lesson for us."

Wilfredo Rojas, Altiplano Coordinator, PROINPA

Long-term, dependable program support and a "different vision of development."

Leaders of the Andean grains programs and senior officers at PROINPA and INIAP all note the value of the continuous, dependable support provided by the Foundation. The CCRP has provided *more* resources for Andean grains R&D than any other donor, and its support has been *continuous over a longer period* than that of any other donor. People in both organizations stressed that the continuity of their Andean grains programs has depended directly on the continuity of support provided by the McKnight Foundation.

"The McKnight Foundation is committed to success of the projects it supports. The foundation monitors work, keeps in touch with Project teams, and allows changes in plans if they are justified. There is a joint commitment to achieve results. "They expect us to move ahead together."

Member of Quinoa Program, PROINPA

"The McKnight foundation is a different kind of donor. They know how to guide institutions toward realistic goals and how to detect problems and respond rapidly."

Wilfredo Rojas, Altiplano Coordinator, PROINPA

Program members feel that the Foundation's vision of development processes is unique in stressing the importance of both technical and social innovation, in stressing the importance of both production and consumption of Andean grains, and in fostering knowledge sharing, learning, and development of local capacity at the level of individuals, programs, and the innovation system as a whole.

Individuals in both countries – in the Andean grains program and senior managers in PROINPA and INIAP – note that members of the CCRP regional team make a greater effort to understand the local setting, needs, and opportunities than is the norm with donor organizations, and they

greatly appreciate this concern for identifying and addressing local problems. Related to this point, it was noted that the CCRP's regional team helps project teams formulate appropriate goals, supports them in achieving them, and then holds them accountable for the results.

"There are no universally valid formulas or recipes. In each location we need to understand the context of the crops and the customs of the people."

Member of Ecuador's Andean grains program

"The McKnight foundation is very committed to resolving real problems in the Andes. I don't know of any other donor that sees things in the same way – that looks beyond the objectives and expected outputs of the specific projects they fund."

Wilfredo Rojas, Altiplano Coordinator, PROINPA

CCRP regional team members are in frequent contact with members of the Andean Grains Programs, through site visits, reviews of annual reports, and annual regional CoP meetings. Program members consider the frequent and substantive (in contrast to administrative) communication with members of the CCRP as one of the most positive features of the CCRP, which distinguishes it from most of the funding agencies (both international and domestic) they have worked with.

"Normally, when you deliver a project report that's the end of it. The difference with the McKnight foundation is that they read the reports and send comments and questions. Sometimes the foundation's comments are strong or their questions are difficult, but they are always pertinent and make us think about our work in new ways."

Alejandro Bonifacio, Plant Breeder and Leader of the Quinoa Program, PROINPA

With most donors, there is little communication aside from the negotiation of project documents, the delivery of periodic reports, and the occasional site visit or external evaluation. Open dialogue with donor representatives is very rare. With the CCRP, there is frequent communication and interaction, and the regional team is open to new ideas and approaches for achieving project objectives. Some of these (for example an approach for conducting a survey or engaging farmers in research) have been communicated to other project teams for their assessment and possible application under their circumstances.

"The caliber of the McKnight Foundation's staff is very important. They are not like others, who come here to impose their views or oblige us to accept their goals and conditions. The Foundation's representatives are open and simple and inspire horizontal, collegial communications and relations."

Member of the Quinoa Program, PROINPA

The CCRP provides opportunities for face-to-face interaction and open dialogue with a wide range of individuals, including individuals from the region with different experiences and perspectives, and experts in key areas from other parts of the world.

"In the CoP everything is discussed with everyone. That is very valuable."

Member of INIAP's Andean grains program

"It is very useful and stimulating to discuss important general topics like climate change. We never have the opportunity to do that in our normal daily activities. I really love the discussions of these "new" topics."

Alejandro Bonifacio, Plant Breeder and Leader, Quinoa Program, PROINPA

Program staff and senior managers at INIAP and PROINPA feel that their project teams are working with (not for) the CCRP, and that the CCRP itself is co-evolving with the projects as they advance. As a result, there is a feeling that the results obtained have been co-generated by the CCRP and the programs working together with farmers and other market chain actors.

"In our ranking of donors, the McKnight Foundation is near the top. Something we value very much is that we learn and develop things together with them. We have very rich discussions and they listen to us."

Antonio Gandarillas, Director, PROINPA

"I really like the way the foundation works, which is much less formal than other donors. The foundation does not have a rigid bureaucracy. It has rules and is strict in applying them, but it also trusts grantees... The foundation does not dictate what people should do. It helps the Project teams formulate their own objectives, and then it demands results. Other donors tend to impose their own objectives... I particularly like the CoP, which motivates creative thinking and action and strengthens ties among participants. At CoP meetings, the regional team moderates discussions on topics of importance to participants. For that reason participants respond favorably to the foundation's ideas."

Ivan Reinoso, Director, Santa Catalina, INIAP

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5. Annexes

The study, objectives, audiences, methods

Study objectives and audiences

Now that the CCRP has been operating for two decades, the foundation seeks to better understand the program's contributions to change and to improve its current and future grant-making. The CCRP approach has evolved over time, and the foundation would like to know how national collaborators view the approach and how it has influenced their organizations R&D strategies and approaches. In this context, the foundation commissioned a set of evaluation studies in Africa and the Andes, to assess the CCRP approach, the program's contributions to R&D capacity, and how improved capacity has contributed to innovation, food security, and farmers' livelihoods.

The Andean evaluation study focused on the foundation's support for R&D with Andean grains in Bolivia and Ecuador. The term "Andean grains" refers to grains and grain legumes that have been domesticated in the Andes and that have long been considered neglected and underutilized. The foundation has supported work with quinoa in Bolivia and with quinoa, lupine, and amaranth in Ecuador.⁷ In these countries, CCRP projects are being hosted by the Quinoa Program of Bolivia's Foundation for Investigation and Promotion of Andean Products (PROINPA) and the Legumes and Andean Grains Program of Ecuador's National Institute for Agricultural and Livestock Research (INIAP).

The Bolivian project,⁸ which began in 2001, is the longest-running CCRP-supported project in the Andes. The Ecuadorian project, which began in 2005, is part of the second cohort of CCRP projects in the Andes. Both projects have engaged in a wide range of activities over the years, including germplasm collection, characterization, conservation, and use in the development of new varieties; development and promotion of improved practices for cultivation, pest management, harvesting and post-harvest operations; diversification of uses of Andean grains, public awareness, and policy influence. These are the only two projects in the CCRP Andes portfolio that include genetic improvement and the release of new crop varieties.

The Andean grain study has three objectives:

1. To assess the development and results of the Andean grains R&D programs in Bolivia and Ecuador
2. To assess the contributions of the CCRP to Andean grains R&D in the 2 countries
3. To formulate lessons for improving the Andean grains programs as well as future CCRP support

Study design and methods

Although the initial motivation for evaluating the McKnight Foundation's support for Andean grains R&D came from within the foundation, the evaluation was carried so as to be of use not

⁷ The crops and described in Section 2 of this report.

⁸ In this report, the term "project" refers to the cluster of activities supported by the CCRP, which has a defined budget, objectives, and timeline.

only to foundation personnel but also to those directly involved in Andean grains R&D in Bolivia and Ecuador – to members of the Andean grains programs and the senior management of PROINPA and INIAP. Hopefully, the study will also be of use to a broader range of individuals and organizations concerned with the use of Andean Grains, and other neglected and underutilized species, to reduce poverty, improve food security, and conserve the natural environment. In this sense, the Andean grains study is a “utilization focused evaluation” – one that is done for and with specific intended primary users for specific, intended uses (Patton, 2008; 2012).

Since one of the primary intended uses of the evaluation is to learn from the work carried out to date to improve the evolving approaches employed by the CCRP and the national Andean grains R&D programs, the study is an example of “developmental evaluation,” which, according to Patton (2011: 1) “supports innovation *development* to guide adaptation to emergent and dynamic realities in complex environments.”

The Andean Grains study is grounded in systems thinking. Following Hargreaves (2010), CCRP work in the Andes is viewed as a system change intervention, designed to bring about changes in Andean grains R&D programs (the immediate targeted systems). The ultimate aim of the CCRP, of course, is not to strengthen R&D programs but to contribute to improved rural welfare.

Agricultural R&D systems are highly complex, as are farming and marketing systems and household economies. Numerous social, economic, cultural, and environmental factors influence the production and consumption of Andean grains and their impact on rural welfare, including the CCRP itself, the Andean grains programs, national agricultural R&D systems, and larger and more complex agricultural innovation systems, and the global food system.

In this study we distinguish R&D from innovation in the following ways. R&D involves the generation and dissemination of scientific knowledge. In contrast, innovation is a broader concept concerned with “the *use* of new ideas, new technologies, or new ways of doing things by people and in places where they have not been used before” (Barnett, 2004: 1 (emphasis added)).

As defined by the World Bank (2006: vi-vii), an innovation system is

“a network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect their behavior and performance”.

Such a system “extends beyond the creation of knowledge to encompass the factors affecting demand for and use of knowledge in novel and useful ways” (*ibid*, vii). In addition to researchers, extension agents, and farmers, an agricultural innovation system includes policy makers, agricultural service providers (such as financial entities, seed certification agencies and non-governmental organizations (NGOs) that support agricultural and rural development), as well as input suppliers, commodity traders, processors, retailers, and consumers (World Bank, 2012).

Perspectives are important for defining “targeted systems.” From the perspective of the CCRP, the targeted system is the Andean grains program. But from the perspective of an Andean grains program, achieving its goals may require targeting many different systems that are concerned with farming, marketing, policy-making, public opinion and household consumption.

Another complicating factor is the diversity of contexts and system dynamics within each of the countries. Ecuador’s Andean grains program works with three different commodities (quinoa, amaranth, and lupine), which are produced and utilized in different ways by different individuals and groups operating in different settings. The program responsible for Andean grains in Ecuador is also responsible for work on edible grain legumes, which takes up approximately 50% of the time of its personnel. Bolivia’s quinoa program is concerned mainly with a single commodity – but one that is cultivated, marketed, and utilized in strikingly different farming, marketing, and household systems in different parts of the country. The Bolivian program also does some R&D work with kaniwa, native potatoes, and other native crops that form parts of local cropping systems.

Author’s biosketch

Douglas Horton is an independent applied researcher and program evaluator who works mainly on topics related to agricultural research and development, innovation, and capacity development. He divides his time between Sarasota, Florida and Lima, Peru. Doug was raised on a farm in Illinois where he attended a one-room school. He earned B.S. and M.S. degrees in agricultural economics from the University of Illinois and a Ph.D. in economics from Cornell University. From 1975 to 1990 Doug established and led the Social Science Department of the International Potato Center, based in Peru. From 1990 to 2004 he was a senior officer at the International Service for National Agricultural Research, in The Netherlands. Doug has been a member of the American Evaluation Association since 1992, and he is also a member of the Canadian and European Evaluation Societies. He has participated in more than 50 evaluations in Africa, Asia, Latin America and Europe. He has published more than 100 articles, books, reviews, and research reports on topics related to the planning, management, and evaluation of programs designed to promote agricultural development and food security, reduce poverty, or conserve the environment.

6. Acronyms and Abbreviations

AEI	Agro-ecological intensification
APROSANAMY	Asociación de Productores de Semillas y Alimentos Nutricionales Andinos, Mushuk Yuyay (Association of Producers of Seed and Nutritious Andean Foods, 'New Thinking'), Cañar, Ecuador
BYU	Brigham Young University
CABOLQUI	Camara Boliviana de Exportadores de Quinoa y Productos Organicos (Bolivian Chamber of Exporters of Quinoa and Organic Products)
CADEQUIR	Cámara Departamental de la Quinoa Real del Departamento de Potosí (Departmental Chamber for Quinoa Real, Department of Potosi), Bolivia
CCRP	Collaborative Crop Research Program
CGIAR	Consultative Group on International Agricultural Research
CIAL	Local Agricultural Research Committees (Comite de Investigacion Agricola Local)
CoP	Community of practice
CORPOPURWA	Corporación de Productores de Leguminosas y Granos Andinos del Pueblo Puruwa (Association of Producers of Legumes and Andean Grains of the Village of Puruwa), Chimborazo, Ecuador
DANIDA	the term used for Denmark's development cooperation, which is an area of activity under the Ministry of Foreign Affairs of Denmark
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	The on-line statistical database of the FAO
FFS	Farmer field school
IBTA	Instituto Boliviano de Tecnologia Agropecuaria (Bolivian Institute for Agricultural Technology)
IFAD	International Fund for Agricultural Development
IMEP	Integrated monitoring, evaluation and planning – the planning, monitoring, and evaluation system developed by the CCRP to foster learning and program improvement
INIAF	Instituto Nacional de Innovacion Agropecuaria y Forestal (National Institute for Agricultural and Forestry Innovation (INIAF), Bolivia)
INIAP	Instituto Nacional Autonomo de Investigaciones Agropecuarias (National Autonomous Institute for Agricultural Research), Ecuador
IPM	Integrated pest management
NGO	Non-governmental organization
PROINPA	Fundacion para la Promocion e Investigacion de Productos Andinos (Foundation for Investigation and Promotion of Andean Products), Bolivia
R&D	Research and development
SDC	Swiss Agency for Development and Cooperation
SWOT	Strengths, weaknesses, opportunities, threats
