



Sustainable Agriculture and Natural Resource Management Collaborative Research Support Program

SANREM CRSP
Office of International Research, Education and Development
Virginia Polytechnic Institute and State University (0378)
526 Price's Fork Road, Room 211
Blacksburg, Virginia 24061

Phone: (540) 231-1230
Fax: (540) 231-1402
sanrem@vt.edu
www.oired.vt.edu/sanremcrsp

Trip Report: Bolivia 25-30 July 2010

Jeffrey Alwang, Virginia Tech; Paul Backman, Penn State; and Bryan Bailey, USDA-ARS

Purpose: (1) To review progress and plan research activities for coming year. And (2) Identify opportunities for expanding work in conservation agriculture in quinoa and transferring SANREM research on biological controls to cacao-growing areas of Bolivia. Both these objectives would support USAID activities in Bolivia.

Sites Visited: PROINPA/ Cochabamba; Tiraque field trial sites, Cochabamba; Quipaquicani Station, and La Paz, Bolivia

Description of Activities:

The team visited PROINPA headquarters in Cochabamba to review research during current year of the CRSP and plan for the subsequent year. Bailey presented seminar on biological control of plant diseases to PROINPA staff. Team reviewed work on biological control and its potential applications within conservation agriculture production systems (CAPS). Javier Aguilera (PhD, soil science) presented his work (funded by the prior phase of the CRSP) evaluating soil quality in the altiplano region. In the study area, soils are characterized by low nitrogen content, low-medium phosphorus, variable potassium, and low organic matter (<1%). Low water availability compounds these nutrient constraints to make production extremely vulnerable. Noel Ortuno (plant pathology PROINPA) discussed biological control possibilities for insect pests, and the team toured the PROINPA biological control laboratory. This laboratory produces substantial quantities of biological controls which can be used as seed treatments, soil amendments, or for direct application to plants. Some products enhanced plant growth substantially; others controlled plant pests and diseases and represent high-potential components for a sustainable CA system. The full working group discussed field trials that would incorporate biologicals into SANREM's existing experimental set-up. An important issue to be addressed in future research is the optimal scale of biological control production. While many control products are currently being produced in the PROINPA lab, several, such as the bacillus bacteria (which promotes plant growth and protects against plant disease), could be produced at a small, artisanal scale by providers other than PROINPA. Such production would stimulate the local economy by retaining local value-added. However, scale considerations might dictate that more centralized production is more viable.

Additional presentations on plant pests and diseases and their means of control (biologically or otherwise) in a CA systems were made by PROINPA scientists Luis Crespo (entomology), Javier Franco (nematology), Giovanna Plata (plant pathology) and Jose Antonio Castillo (molecular biologist). Of note, Castillo presented soil metagenomics work conducted jointly with Karen Garrett (Kansas State) under the prior CRSP. There is substantial evidence from these limited metagenomics studies that continued research focused on specific microbial factors would provide good indications of soil health.

The working group reviewed experimental designs for CA trials presently being established in Tiraque and made suggestions about potential modifications to this design. In particular, a means of incorporating biological controls into the design were addressed and minor modifications to the farmer practice experimental control were identified. Ruben Botello agreed to incorporate these modifications into the design. The group also discussed the potential for collaboration with USAID's Food Security Project. SANREM/PROINPA can contribute by providing research related to CA in quinoa, support for biological controls for pests and diseases, soil quality assessments, impact assessments, and others. Penn State and SANREM have resources for ½ of an additional graduate student. This student would study biological controls and PROINPA indicated that they are having difficulty finding resources to pay their ½ of this student. They are actively seeking additional support to fill this shortfall of about \$20,000.

Team subsequently traveled to La Paz to visit PROINPA's altiplano experiment station Quipaquicani established at 13,500 ft. Presentations were made by PROINPA scientists (Alejandro Bonifacio, station director and Raul Sanabria, entomology) on quinoa production constraints and the need to create a quinoa CAPS. Quinoa is produced on some of the most fragile areas of the altiplano by relatively poor families. These areas contain important wetlands that shelter migratory birds and maintain humidity for the entire altiplano region. Quinoa prices have doubled in recent years and there appears to be unlimited demand for Bolivian organic production. This production is concentrated in the drier southern altiplano where producers are seeking to expand production. Downy mildew appears to be the main pest constraint, while low soil fertility, wind erosion, and lack of water also constrain production. There is some evidence that export-oriented production has led to a deterioration of the local diet with less-expensive carbohydrates such as rice and pasta being substituted for high protein quinoa. Producers in the south are mostly members of a large producer organization (*Asociacion Nacional de Productores de Quinoa*), which will facilitate outreach. Quinoa programs in Quipaquicani have made extensive use of student research projects and have housing and research support facilities for students.

The team met with the leadership of the USAID-funded "*Proyecto Integrado de Seguridad Alimentaria*" (PISA), an integrated food security project. Present at the meeting were Ricardo Roca (USAID), Sergio Claure (PISA director), Gonzalo Avila (PISA vice director), Boris Fernandez (PISA biodiversity specialist), Cesin Curi (Director CPTS—Sustainable Production Technology Center—an NGO working in quinoa for PISA), Alejandro Bonifacio (PROINPA), and Javier Aguilera (PROINPA). PISA made a presentation on the 9 components of their integrated project which includes, among other things, components to address production and marketing systems, quinoa, biodiversity conservation, adaption to climate change, health and

infrastructure. It is clear that the project needs specialized technical assistance in a number of areas related to agricultural production constraints, soil quality, and impact assessment. Curi presented the PISA/CPTS vision for a sustainable quinoa production and marketing system in the drier areas of the southern and central Altiplano. Technical obstacles include access to sufficient nutrients, pest constraints, and the socio-economic impacts of a major shift in the production system. The PISA/CPTS vision includes moving production from the wetter hillside areas to the drier Altiplano floors and changing the production system from a smallholder, family-based system to a cooperative-based commercial operation. The project will begin with three 500 hectare pilot projects and grow over time. The PISA/USAID group will develop a concept (by August 10) of how they might collaborate with SANREM.

The next day, the team, together with Aguilera, met with Roca (USAID) and members of USAID's organic cacao promotion program (the Actividad Rural Competitiva or ARCo). Present at the meeting were Luis Meneses (ARCo GIS specialist), Ivan Clavijo (ARCo program director) and Sergio Ichuta (technical assistance in cacao). Purpose of meeting was to discuss potential SANREM/PROINPA collaborations. This project provides full assistance to the cacao value chain in Alto Beni (Yungas province). Several production constraints include the diseases black pod (caused by *Phytophthora palmivora*) and witches broom (caused by *Moniliophthora perniciosa*), and damage from chinch bug insects. Frosty pod disease (caused by *Moniliophthora roreri*), which is a common and destructive pathogen in many cocoa-growing areas of South America is reportedly not present in the areas discussed. Several of the biological controls being developed and tested as a part of SANREM in Ecuador and Bolivia could be of use to address these problems. The group agreed that Clavijo and Aguilera would write a brief concept note to outline potential areas of collaboration.

Observations:

- 1) Establishment of the CA trials in Tiraque will begin in September. Robert Gallagher (Penn State) is planning to travel to Bolivia to participate in the establishment work. Botello will finalize design of trials by the end of August.
- 2) A soil testing protocol has not been completed. It is important that we collect soil samples as a baseline for our field trials beginning in September. Botello will interact with the soil quality CCRA and Penn State scientists to finalize this protocol. Storage of soil samples is recommended so, if a different protocol is established in the future, we can return to prior samples.
- 3) Available nutrients represent a significant barrier to increased productivity in all locations in Bolivian altiplano. Organic alternatives or biological treatments to solubilize phosphorus or fix nitrogen are needed.
- 4) Stronger linkages between the PROINPA/SANREM research complex and the USAID projects might create large benefits. Sustainable production systems face a number of technical obstacles and much of the PROINPA/SANREM research is directly relevant. For instance, the intensive quinoa system envisioned by PISA is likely to face unknown (at this time) pest constraints; water and nutrient constraints are likely to be exacerbated by the intensity of the system. Social impacts are difficult to forecast, but means of monitoring and assessing them are needed.

- 5) Linkages between USAID-sponsored projects and SANREM research would be greatly strengthened with additional support for graduate students. PROINPA, PISA and ARCo, together with USAID, should put high priority on identification of students and sources of funds to support their study.

Suggestions and Recommendations:

- 1) Protocol for SANREM soil sampling analysis is needed urgently. Botello and Barrera (Ecuador, SANREM regional coordinator), in concert with Gallagher (PSU) and Delgado (ARS) and the CCRA (Mulvaney—Virginia Tech) need to finalize this protocol prior to establishment of the experiments in August-October of this year.
- 2) PISA, together with USAID, will develop a brief concept note (Avila to take leadership) to outline actions that might be taken to create linkages between PISA and SANREM. These linkages are likely to be in response to four dimensions: (i) soil quality/health diagnosis, (ii) biological controls and biological plant growth promoters, (iii) pest management, and (iv) impact assessment.
- 3) Clavijo and Aguilera will write a concept note to outline potential areas of collaboration between PROINPA/SANREM and the cacao project.
- 4) PROINPA (especially Botello) will devote effort to identifying and producing publications that describe research findings in Bolivia.

Training Activities Conducted:

Program type (workshop, seminar, field day, short course, etc.)	Date	Audience	Number of Participants		Training Provider (US university, host country institution, etc.)	Training Objective
			Men	Women		
Seminar	July 26	PROINPA Staff	20	15	USDA/ARS	Disseminate information about biological controls

List of Contacts Made:

Name	Title/Organization	Contact Info (address, phone, email)
Sergio Claure	Director PISA (USAID food security project)	sclaure@ifsproject.org
Gonzalo Avila	Vice-director, PISA	gavila@ifsproject.org
Boris Fernandez	Biodiversity specialist, PISA	bfernandez@ifsproject.org
Ivan Clavijo Pusztavari	Director ARCo (USAID cacao project)	iclavijo@arcobol.com
Luis Meneses	GIS specialist ARCo	lmeneses@arcobol.com
Sergio Ichuta	Agronomy technician/cacao specialist ARCo	sergiowalker@hotmail.es
Cesin Curi	Sustainable Production Technology Center (La Paz)	cesin.curi@ctps.org