Biodiversity and IPM/IDM

- Conservation and improved use of local varieties
- Integrated pest and disease management in SANREM communities
- Predicting impacts of climate change on disease risk in the region using GIS
- New linkages
- Training activities

Ancoraimes: local potato varieties

Julio Sarmiento, licenciatura student

- Year 2
  - Two communities (29 farmers) participated in collection, evaluation, and characterization of 55 accessions in farmers' fields
  - Maintained seed from each accession and plot
- Year 3
  - Identification and multiplication of 10-12 accessions for further participatory evaluation, including market analysis

Umala: local potato varieties

Miguel Angel Gonzales, M.S. student
Milan Mamani, licenciatura student
Bernardo Baltazar, community trainer

- Year 2
  - Collection of 118 local varieties and participatory evaluation of their quality
- Year 3
  - Identification of 3 or 4 varieties with high market potential in participatory evaluations

Ancoraimes: local oca varieties

Julio Sarmiento, licenciatura student

Oca
Oxalis tuberosa

- Year 2
  - Two communities (29 farmers) participated in collection, evaluation, and characterization of 21 accessions in farmers' fields
  - Maintained seed from each accession and plot
- Year 3
  - Identification and multiplication of 5-8 accessions for further participatory evaluation, including market analysis
  - Multidisciplinary analysis of factors leading to decreasing acreage of oca and other Andean crops

Umala: local quinoa varieties

Carola Chambilla, PROINPA
Several licenciatura students
Bernardo Baltazar, community organizer

Photo: P. Motavalli

- Year 2
  - Participatory evaluation of 5 introduced varieties and 1 native variety in 4 communities
- Year 3
  - Participatory selection of 2 varieties and training in improvement of seed production
  - Development of quinoa IPM/IDM, including participatory testing of plant extracts for management of quinoa pests

Synthesis of research in agricultural biodiversity in the Bolivian highlands

Dora Aguilar, licenciatura student

- Synthesis of work with diversity in Andean crops
  - Tubers: Potato (83 studies), Oca (2), Ulluco (2)
  - Roots (2) : Arracacha, Yacón, Mauk'a, Ahipa
  - Grain: Quinoa (58), Cañahua (14), Tarwi (2)
- Identified local institutions with unpublished research available
- Year 2: Developing database including these unpublished sources (numbers as of May)
- Year 3: Publishing open-source on-line peer-reviewed synthesis and recommendations for future research in specific crops and locations

Ancoraimes: Potato tuber moth and Andean potato weevil

Antonio Paz Arcani, licenciatura student
Nelly Calle Kantuta, licenciature student

- Year 2
  - Community training and participation in research
    - Integrated pest management training in participatory courses
  - Experimentation
    - Studies of potato tuber moth and Andean potato weevil population dynamics (El Niño)
- Year 3
  - Community training and participation in research
    - Incorporation of two new communities for participatory training
  - Experimentation
    - Studies of the population dynamics of the two pests under the environmental conditions of another year
    - Studies of economic and sociological aspects of pest management choices, including gender effects on decision-making

Umala: Potato tuber moth and Andean potato weevil (Year 2)

Miguel Angel Gonzales, M.S. student
Miriam Gomez, licenciatura student
Claudia Jarandilla, licenciatura student
Bernardo Baltazar, community trainer

- Community training and participation in research
  - Integrated pest management
  - Preliminary training in preparation of plant extracts as repellants
- Experimentation
  - Studies of potato tuber moth population dynamics in the three species and dynamics of Andean potato weevil populations (El Niño)
  - Preliminary studies of plant extracts as repellants

Umala: Potato tuber moth and Andean potato weevil (Year 3)

- Community training and participation in research
  - IPM and extract tests in farmers' fields
- Experimentation
  - Continue studies of potato tuber moth population dynamics under the different climatic conditions of the next year
  - Quantify level of insect control using plant extracts and adaptation by farmers, and determine optimal methods for plant species selection and fermentation

Background: Climate change and plant disease risk

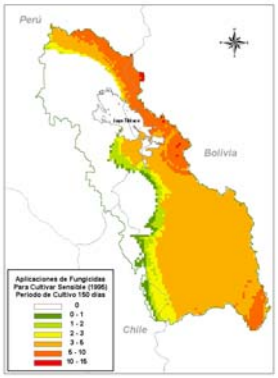
PDFs available through publication link at
www.ksu.edu/pdecology

K. A. Garrett, S. P. Dendy, E. E. Frank, M. Rouse, and S. E. Travers. 2006. Climate change effects on plant disease: Genomes to Ecosystems. Annual Review of Phytopathology.

G. A. Forbes, N. J. Grunwald, E. S. G. Mizubuti, J. L. Andrade-Piedra, and K. A. Garrett. In review. Potato late blight in developing countries.

K. A. Garrett and C. M. Cox. 2007. Applied biodiversity science: Managing emerging diseases in agriculture and linked natural systems using ecological principles. Chapter in R. Ostfeld, F. Keesing, V. Eviner (eds) Cary Conference XI: Infectious disease ecology: the effects of ecosystems on disease and of disease on ecosystems. Princeton University Press. In press.

Fungicide applications as a function of climate



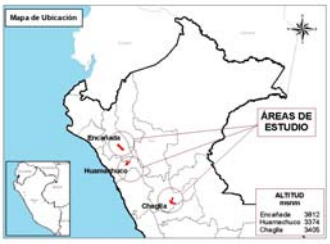
Rubi Raymundo, student

Year 2: Development of initial estimates of reliance on fungicides for late blight (using GIS)

Year 3: Test of models for potato tuber moth using GIS

New USDA project with CIP building on SANREM collaboration

Study sites in Peru



Drivers of varietal change: assessing impact of late blight resistant cultivars

Incorporating predicted climate change scenarios

To include Peru, Uganda, and China

CIP (Int'l Potato Center)
Kansas State University
American University

Potential new link: Characterizing microbial communities

- NSF-funded projects at KSU developing new methods for characterizing microbial communities using 454 sequencing
  - Rapidly developing technologies
  - Can be applied to microbial communities in soils or plants
- Considering applications to study soils in Bolivian communities in Umala and Ancoraimes – great potential for training students in biology
- Also could be exciting project to link soil studies across SANREM studies

Photo: P. Motavalli

Training linkage:

Biodiversity, conservation, and ecosystem services in managed landscapes

- Distributed graduate seminar
  - Sponsored by US National Center for Ecological Analysis and Synthesis
  - 10 synthesis papers in this subject areas
- SANREM students engaged in manuscript on 'Plant disease in the context of ecosystem services'
- Editor-in-chief of the journal Phytopathology encouraged submission of the synthesis

Training

Development of 5 sets of exercises to train advanced students in use of the R programming environment for statistical analyses in IPM/IDM and epidemiological modeling

- For publication in the open-source peer-reviewed APS journal Plant Health Instructor
  - http://www.apsnet.org/education/phi_index.html
- English versions of 3 exercise sets are in review now, will be translated into Spanish in year 3
  - http://www-personal.ksu.edu/~asparks
    - User: JSS (uppercase)
    - Password: jss (lowercase)