



photo: Stephen Sherwood

Farmer Field Schools for ecological potato production in the Andes

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Various partners are working with farmers to strengthen local innovative capacity as a means of enhancing production and integrated management of potato in the Andes. Groups in Ecuador, Peru and Bolivia have used the Farmer Field School approach as a jumping-off point to tackle a range of challenges, most notably knowledge gaps and the devastating late blight disease.

Challenges to Andean potato farming

Although potato has been a staple crop in the Andes for millennia, modern population pressure has led to agricultural intensification and in turn to ecological disturbance and land degradation. Chemically intensive technologies have allowed for increased potato production in many areas, but at great costs to ecosystem health and also to farmers exposed to toxic substances. Modern market forces have contributed to the sharp reduction in potato varieties, and the trend is toward shortened fallow periods and monocropping. Mechanised tillage in many areas has contributed to physical soil erosion and compaction. High input requirements and market price fluctuations have led to significant loss of profitability.

The effects of ecological disturbance are acutely evident with late blight, a particularly destructive disease caused by a fungus-like microbe. Late blight contributed to the Irish potato famine of the 1840s when the

pathogen arrived to Ireland from its centre of origin in Mexico. Since the 1980s, pathogen migrations have brought fungicide-resistant strains to South America.

Management of late blight poses special challenges for several reasons: the high risk of crop loss, the invisible nature of the pathogen, the lack of natural enemies, and the small number of effective management tactics. As a result, it is difficult, in many parts of the Andes today, to grow the crop without regular fungicide applications.

Meanwhile, "modernisation" policies and structural adjustments have dismembered classical agricultural extension and research services in the Andes. The financial support to relevant public institutions has been severely decreased by full privatisation, as in the case of the national research institution in Bolivia, or semi-privatisation, as in Ecuador. This has transformed the roles of researchers and extensionists and placed greater responsibility on rural communities. While tremendously challenging for institutions, improving present-day agriculture will demand approaches that are more responsive and better suited to local agroecological and socioeconomic conditions.

Responding to collapse

The International Potato Center (CIP), the FAO's Global IPM Facility, and a diverse group of governmental and non-governmental organisations are working with Andean communities in Ecuador, Peru and Bolivia in responding to pressing potato-farming demands. Project partners are striving to enhance farmer understanding of

agro-ecosystems and to strengthen local decision-making and technology development capacities for more productive and sustainable agriculture. Faced with tremendous pest problems and pesticide abuse, they are emphasising management-intensive approaches that require a good understanding of biology and ecology.

Beginning in the early 1990s, CIP began to work more closely with communities and other partners to strengthen potato IPM. Such collaborative arrangements have yielded diverse benefits. Communities gained new access to information and institutional resources, rural development agencies received increased technical support, and research organisations found brokers to mediate between their relatively narrow interests and the broader needs of communities.

The partners are building on this experience through a range of participatory extension and research models, in particular the Farmer Field School (FFS) methodology developed by the FAO in Asia, Local Agricultural Research Committees (CIALs) developed by CIAT, and Farmer-to-Farmer extension developed by World Neighbors and others in Central America.

Farmer Field Schools

From 1993-1996, CIP and CARE collaborated on IPM in the Peruvian Andes, working in community-based "pilot units" to validate and implement a series of management tactics for insect pests. Seeking sustainable mechanisms for participatory training and research, CIP and CARE began to test the Farmer Field School model in 1997.

CIP staff based in Peru, Bolivia, and Ecuador who were experienced with participatory methods, began to work with national counterparts to adapt the FFS approach to the diverse conditions of Andean potato farmers. The initial agronomic emphasis was on disease management, but now includes general pest and soil fertility management.

The Global IPM Facility led an intensive three-month training of trainers (TOT) in FFS for a group of 35 extensionists from the three countries, who have served as resource people for further developing national initiatives.

CIP's decentralised mode of operation has permitted semi-independent evolution of its national efforts. While each country promotes similar technical themes, such as agroecology, IPM and, in particular, late blight management, modalities and processes change depending on local needs and interests.

Ecuador: Community-based extension and pesticide reduction

CIP and the Ecuadorian National Institute for Agricultural Research (INIAP) collaborate with a large number of NGOs, in particular the Centro Julian Quito, the International Institute for Rural Reconstruction (IIRR) and World Neighbors, and with local municipalities to establish community-based extension systems in response to government restructuring. The FFS methodology strengthens extension approaches that previously centred on technology transfer modes of change. Early work centred on improving facilitation skills and independent farmer learning through self-discovery techniques. The partners now place emphasis on the training of farmer promoters and on linkages with farmer-to-farmer extension.

By the end of 2000, fifteen farmer field school courses would have been completed with the objective of helping farmers to fill knowledge gaps for better understanding of general agroecology and achieving more integrated (i.e., with less external input) management of production. Field school facilitators have shared endogenous know-how, such as a promising limited tillage system known as *wachu rozado*, and have introduced new technologies, such as late blight resistant varieties and insect traps.

As with the Asian experience in which FFS were organised for IPM in rice, the Ecuadorian field schools have used site visits between FFS groups and field days for exchange of ideas and raising public awareness. FFS graduates have expressed interest in follow-up activities, creating links with existing CIAs and establishing their own participatory technology development groups.

Bolivia: Decision support systems and resistance management

The Bolivian Foundation for Research and

Promotion of Andean Products (PROINPA) had worked with farmers to develop and test improved simple decision support systems (DSS) for managing fungicides with resistant and susceptible varieties. Use of the DSS was seen to be highly profitable. The FFS approach was adapted as a way of teaching farmers about diagnosis, disease processes, and implementation of the DSS. Learning parcels in most FFSs contrasted the use of DSS with normal farmer practice, with three resistant varieties and one susceptible. ASAR, a collaborating NGO involved, added a change from inorganic fertiliser to manure and wider spacing, to look at the effects of cultural practices on disease development.

Farmer participants have also conducted trials of advanced clones with late blight resistance, where they evaluate varieties at flowering, harvest and after cooking. FFSs were conducted in seed producing communities located at altitude extremes, with the intention of generating seed flows from higher altitudes, where pests tend to be less problematic, to lower zones. As follow-up, a group is planting basic seed of three resistant varieties for seed consumers in the lower zone.

Peru: Capacity building and varietal selection

Since 1997, CARE and CIP have worked with farmer groups in Cajamarca, using the FFS approach to strengthen farmers' knowledge of crop management and to provide access to potato varieties and breeding lines with resistance to late blight. Initial work centred on disease management is evolving toward broader pest and crop management.

The first campaign involved a season-long training programme with four communities and included participatory experiments to test varieties and breeding lines under different fungicide regimes. The curriculum concentrated on disease processes, diagnosis, and management. In the field experiments, the yields of the moderately resistant varieties varied according to fungicide treatment, while the resistant varieties performed well even at low fungicide levels. Eight additional communities participated in the second season. Participants continued testing clones in their own fields, and CARE provided credit to allow larger-scale production of the most promising variety identified in the first years' FFS. Three breeding lines were released by other institutions based in part on the results obtained by the FFS groups. Qualitative evaluations show that farmers have enhanced their general IPM knowledge, particularly regarding late blight management.

The partners are currently facilitating 13 FFS in Cajamarca, with six more groups being led by new partner organisations. The basic curriculum now includes insect ecology and management, and each FFS group is conducting multiple experiments. One general problem is a tendency to

design overly complex experiments. In future seasons, experiments will be tailored to the particular interests of the community.

Lessons and challenges

Introducing FFS to the Andes required more than just a re-writing of extension manuals. Local extensionists who agreed on the benefits of 'discovery-based learning', took to heart the re-design of their activities to create a new extension guide (see Pumisacho and Sherwood, 2000). Regarding the technical approach to IPM, extensionists generally favoured the less academic approach of the Asian FFS, which centred on the following principles: grow a healthy crop, conserve natural enemies, observe the crop regularly, and help farmers become experts.

Late blight in the Andes poses a special challenge to FFS and integrated disease management, and in particular to pesticide reduction. The disease's aggressive epidemiology has left farmers with few alternatives to fungicides. Consequently, FFS have had to emphasise not just capacity building, but also technology development in order to assist farmers in improving management of the disease and overall farming productivity.

Farmers and partner organisations have requested training in other components of Andean cropping systems, animal-pasture management, and greenhouse crops, requiring new institutional arrangements, curriculum development, IPM expertise and continued technology development. Further, communities in each country have solicited FFS in IPM for youth, so TOTs for teachers in technical aspects of IPM and FFS methodology are needed.

The FFS approach has been recognised as a highly flexible platform for bringing farmers, extension workers, and researchers together to improve potato production. Expanding and sustaining this work in an age of decreasing government support for agricultural development will require increased community leadership. The partners will be looking at "farmer-to-farmer" approaches that have proven so successful in Central America and elsewhere. National-level projects have recently been approved to expand FFS in Ecuador and Peru. They hope that these and similar initiatives in Bolivia will enhance community capacity to catalyse agricultural improvement in the region. ■

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