Farmer Field Schools in Potato: A new platform for participatory training and research in the Andes

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Partners are working with farmers to strengthen local innovative capacity as a means to 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 the devastating disease late blight.

Modern challenges to Andean potato farming

Although potato has been a staple crop in the Andes for millennia, modern population pressures has driven agricultural intensification that has contributed 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 exposing farmers to toxic substances. Modern market forces have contributed to the sharp reduction of potato biodiversity and the trend is toward shortened fallow periods and monocropping. Mechanized tillage in many areas has contributed to physical soil erosion and compaction. Input demands and price fluctuations have caused farmers to lose money on significant percentage of their plantings. In many ways modern technologies have worked against rural progress in the name of short-term production, resulting in an increasingly unstable agro-ecosystem, with declining soil fertility and increasing pest problems.

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 center of origin in Mexico. Since the 1980s, pathogen migrations have brought fungicide-resistant strains of the pathogen to South America. 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, today in many parts of the Andes, it is difficult to grow the crop without regular fungicide applications.

Meanwhile, “modernization” policies and structural adjustments have dismembered classical agricultural extension and research services. This has transformed the roles of researchers and extensionists and placed greater responsibility on rural communities. While tremendously challenging for present institutions, improving present agricultural will demand approaches that are more responsive and better-suited to local agroecological and socioeconomic conditions. More than ever, we need to re-think how to organize ourselves for greater and more effective agricultural innovation.

Responding to collapse through collaboration
The International Potato Center (CIP) and a diverse group of governmental and non-governmental organizations are working with Andean communities in Ecuador, Peru and Bolivia to respond to pressing potato-farming demands. We 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, we are emphasizing management-intensive approaches that require strong understanding of biology and ecology.

Beginning in the early 1990s CIP began to work more closely with communities to strengthen potato IPM. Presently, we are building on this experience through a range of participatory extension and research models, in particular 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.

CIP researchers engage with communities in collaboration with NGOs and municipal governments. Such collaborative arrangements can yield diverse benefits. For example, communities gain new access to information and institutional resources; rural development agencies gain increased technical support, and research organizations gain brokers to mediate between their relatively narrow interests and the broader needs of communities.

**Strengthening participatory research and training through 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, with initial focus on disease management. CIP staff experienced with participatory methods, based in Peru, Bolivia, and Ecuador, began to work with national counterparts to adapt the FFS approach to the diverse conditions of Andean potato farmers. While FFS have been used extensively for IPM training, we are also utilizing the approach to further research objectives.

Funds for developing pilot-scale FFS in potato were obtained from IFAD (for Peru and Bolivia), OPEC (for Ecuador), and other sources. Following initial experiences, the FAO financed and facilitated an intensive three-month training of trainers (TOT) in FFS for a group of extensionists from the three countries, who have served as resource people for further developing national initiatives in the area.

CIP’s decentralized 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. Efforts in Ecuador have centered on capacity building, while those of Bolivia and Peru have covered both capacity-building and participatory technology development (Table 1).

**Ecuador: Community-based extension and pesticide reduction**
CIP and the Ecuadorian National Institute for Agricultural Research (INIAP) collaborate with NGOs and local municipalities to develop community-based extension systems in response to government restructuring. FFS methodology strengthens extension approaches that previously centered on technology transfer modes of change. Early work centered on improving facilitation skills and independent farmer learning through discovery techniques. We are now emphasizing the training of farmer promoters and linkages with farmer-to-farmer extension.

Nine farmer field schools have been completed with the objective of helping farmers to fill knowledge gaps for better understanding of general agroecology and achieving greater IPM. Field school facilitators have promoted 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. Communities have requested that FFS also reach youth, so we are designing TOTs for grade school teachers and are testing IPM training as part of the formal education curriculum.

As with the Asian experience, our field schools include site visits between FFS groups and field days to promote exchange of ideas and public awareness raising. FFS graduates have expressed interest in follow-up activities, so we are helping them to link with existing CIAls and to establish their own participatory technology development groups. Graduates have also become active in initiatives to control pesticide use. Participants from Carchi helped to organize a provincial forum on negative impacts of pesticides and have circulated a petition soliciting greater government control over pesticide distribution and IPM training.

**Bolivia: Decision support systems and resistance management**

The 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 had been shown 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 FFS contrasted the use of DSS with normal farmer practice, with three resistant varieties and one susceptible. ASAR, a local NGO involved, added a change from inorganic fertilizer to manure and wider spacing, to look at the effects of cultural practices on disease development.

FFS farmers in Bolivia have also conducted trials of advanced clones with late blight resistance, where farmers evaluate varieties at flowering, harvest and after cooking. FFS were conducted in both seed producing communities at higher altitudes and seed consuming communities at lower altitudes, with the intention of generating seed flows from the higher to the lower zones by linking selection by both types of communities. As follow up in the higher altitude FFS a group of farmers will plant basic seed of three resistant varieties to supply seed consumers in the lower altitude.

**Peru: Capacity building and varietal selection**

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

The first season involved a season-long training program 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 have shown that farmers had enhanced their general IPM knowledge, particularly regarding late blight management.

CARE and CIP are currently facilitating 13 FFS in Cajamarca, with six more groups being led by new partner organizations. We have expanded the basic curriculum to include new emphasis on insect ecology and management, and each FFS group is conducting multiple experiments. Over the course of the season, the farmers and facilitators have adapted agroecosystem analysis to include observations from experimental plots with varying objectives. One general problem has been a tendency to design overly complex experiments. In future seasons, we will reduce the number of experimental plots and expand their size, tailoring the experiments 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. Partner organizations were generally hesitant to blindly accept external ideas, but they were willing to explore common principles among successful IPM work and to adapt local methods. For example, after agreeing on the benefits of ‘discovery learning’, local extensionists took to heart the re-design of their activities to create a new extension guide (see Pumisacho and Sherwood, 2000). The result was both a reification of and improvement on existing experience.

Late blight poses special challenge to FFS and integrated disease management, and in particular pesticide reduction. The disease’s aggressive epidemiology has left us with relatively few alternatives to fungicides. Consequently, FFS have needed to emphasize not just capacity-building, but also technology development. Through visualization of disease processes using humid chambers and mini-microscopes, the enhancement of the AAE to emphasize disease-causing factors, development of appropriate decision-support systems, and local selection of resistant varieties, we are hoping to help farmer improve management of the disease.

Farmers and partner organizations 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 as well as FFS methodology are needed.

We have found the FFS approach to be a highly flexible platform for bringing farmers, extension workers and researchers together to improve potato production. To expand and sustain this work in an age of decreasing government support for agricultural development will require creative mechanisms. We will be looking to “farmer-to-farmer” approaches that have proven so successful in Central America and elsewhere. A national-level project has recently been approved to expand FFS in Peru. We hope that this and similar initiatives in the other countries will encourage greater participatory extension and research in the region.

References


Table 1. Comparison among national initiatives

<table>
<thead>
<tr>
<th>Feature</th>
<th>Ecuador</th>
<th>Bolivia</th>
<th>Peru</th>
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<tbody>
<tr>
<td>Principal collaborators</td>
<td>INIAP, MAG, 5 NGOs</td>
<td>PROINPA, ASAR</td>
<td>INIA, CARE, UNDAC, University of Oxapampa</td>
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<td>Scale</td>
<td>9 groups</td>
<td>8 groups</td>
<td>34 groups</td>
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<td>Technical themes</td>
<td>General crop management (pests and fertilization) and late blight resistance</td>
<td>Late blight decision-support systems with resistant and susceptible varieties</td>
<td>Selection of late blight resistant varieties, disease management, integrated crop management</td>
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<td>Methodologies</td>
<td>Farmer Field Schools, Farmer-to-farmer extension (linkages to CIALs)</td>
<td>Farmer Field Schools (linkages to CIALs)</td>
<td>PTD through semi-specialized Farmer Field Schools</td>
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<td>Emphasis</td>
<td>Discovery learning, agro-ecological education</td>
<td>Discovery learning and participatory research</td>
<td>Discovery learning, group-managed experiments.</td>
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<tr>
<td>Farmer-led experiments</td>
<td>Fertilization, insect traps, testing of resistant varieties, limited tillage</td>
<td>Variety selection, decision-support systems with resistant varieties.</td>
<td>Variety selection, interaction of fungicides and resistance, insect traps, true potato seed</td>
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<tr>
<td>Outputs/products</td>
<td>• FFS curriculum • Documentation of discovery learning</td>
<td>• Fungicide decision support system • Resistance</td>
<td>• Facilitator’s guide • Development of potato materials</td>
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<tr>
<td>activities</td>
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<td>• 10 trained facilitators</td>
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<td>• 135 FFS graduates</td>
<td>• 150 FFS graduates</td>
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<td>• Policy declaration</td>
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<td>• 12 trained facilitators</td>
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<tr>
<td></td>
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<td>• 200 FFS graduates</td>
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