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Training and Technical Assistance for Seed Production of Native Potatoes in Perú

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Abstract

In the Andes of Peru, farmers grow hundreds of varieties of native potatoes, both for their own use and for the markets. The native varieties have an inestimable genetic value. The demand for native potatoes is increasing, but the productivity is low. This is mainly due to the lack of quality seed. Diaconía (www.diaconiaperu.org), a social program of the Lutheran Church in Peru, provides assistance in the cultivation of native potatoes for producer associations in the Peruvian Andes in the Departamento de Huánuco, at ~ 4000 m altitude. Farmers specify their problems in growing potatoes in interactive workshops. They list the problems in writing and organize them into categories. Problems are clarified in theoretical classes and in field practices. Conclusion from the workshops - among others: Agriculture requires training throughout lifetime.

Keywords: Native potatoes, Perú, biodiversity, training and technical assistance for farmers

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Background - Biodiversity of Native Potatoes

The South American Andes are the principal homeland and the center of genetic diversity of the (*Solanum*) potato.

According to the the International Potato Center (CIP, Lima, Peru; <https://cipotato.org/>),

... more than 4,000 varieties of native potatoes grow in the Andean highlands of Peru, Bolivia, and Ecuador. Selected over centuries for their taste, texture, shape and color, these potato varieties are well adapted to the harsh conditions that prevail in the high Andes, at altitudes ranging from 3,500 to 4,200 meters. Farmers generally produce these native varieties with minimal or no use of agrochemicals.

Diversity is conserved on farms and in communities for subsistence use and as a highly valued heritage. Most of these varieties never see a market; they are traded among highland and lowland communities and given as gifts for weddings and other occasions. The varieties differ from community to community.

It is believed that wild tubers were first domesticated around 8,000 years ago by farmers who lived on the high plains and mountain slopes near Lake Titicaca, which borders modern-day Bolivia and Peru. The tubers grew well in the cold, harsh climate and quickly took root as a centerpiece around which life revolved. (<https://cipotato.org/potato/native-varieties/>)

CIP maintains a potato germplasm collection with about 4,700 accessions that includes over 4,300 traditional landrace cultivars from 17 countries (mainly from the Andean region) and improved varieties.

Most accessions belong to *Solanum tuberosum* subsp. *andigenum*, *Solanum stenotomum* subsp. *stenotomum*, *Solanum stenotomum* subsp. *goniocalix*, *Solanum phureja*, and *Solanum ×chaucha* (<https://cipotato.org/genebankcip/process/potato/potato-cultivated/>).

Among several germplasm management strategies, CIP strengthens the sustainable management of potato biodiversity in farmers' fields through participatory activities for the maintenance of diversity in close collaboration with Andean farmers and communities in the Peruvian highlands. Collaboration includes the development of dynamic conservation strategies combining traditional practices and modern science to improve the management of biodiversity by farmers and the identification of micro-centers of genetic diversity in need of conservation.

Through CIP's initiative *Chirapaq Ñan*, or *Ruta del Arcoiris*, a network of such micro-centers of high diversity of native potatoes monitors systematically the status of conservation of varieties at their natural environment (*in situ*). (<https://cipotato.org/publications/chirapaq-nan-la-ruta-del-arco-iris/>)

Only for seven Andean provinces of the Departamento de Huánuco in central Perú, Ing. Rolando Egúzquiza, researcher and professor at the Universidad Nacional Agraria de La Molina in Lima, recently presented a catalogue illustrating and describing 370 varieties of native potatoes.

Rationale - Collaboration with Farmers

In the Departamento de Huánuco, the NGO *Diaconía* initiated collaboration on „Training and technical assistance for seed production of native potatoes in Perú“. *Diaconía* (www.diaconiaperu.org) was officially formed in 1983 as a social program of the German-speaking Lutheran Church in Lima, Perú (www.ev-kirche-peru.org). The roots of *Diaconía* go back to the devastating (7.9 Richter scale) earthquake of 31 May 1970, after which the Lutheran Church initiated reconstruction assistance. From there, social projects on rural and agricultural development expanded throughout the entire country.

Because of its relevance for livelihood for rural communities in the Andean highlands, the production of potatoes, and especially seed potatoes, became an important component of the program of *Diaconía*. After initial successes - and subsequent difficulties due to social instability caused by the *Sendero Luminoso* communist militant group - in 2011 *Diaconía* resumed its assistance on potato seed production. *Diaconía* now dedicated efforts towards native potatoes.

Diaconía concentrated its assistance on villages between 3,500 and 4,500 m altitude, initially at the Provincia de Huamalíes and around its capital Llata, later also at the district of Marías in the Provincia de Dos de Mayo. Both provinces are located in the Departamento de Huánuco along the Rio Marañón, a tributary of the Amazon river.

Due to the professional and personal connections, the NGO *Instituto Politécnico Tomás Katari* (IPTK; <http://iptk.org.bo/>), Sucre, Bolivia, at the beginning of 2013 invited *Diaconía* for two weeks to apply its experience at several villages around Ravelo near Sucre.

Method - Workshops with Farmers

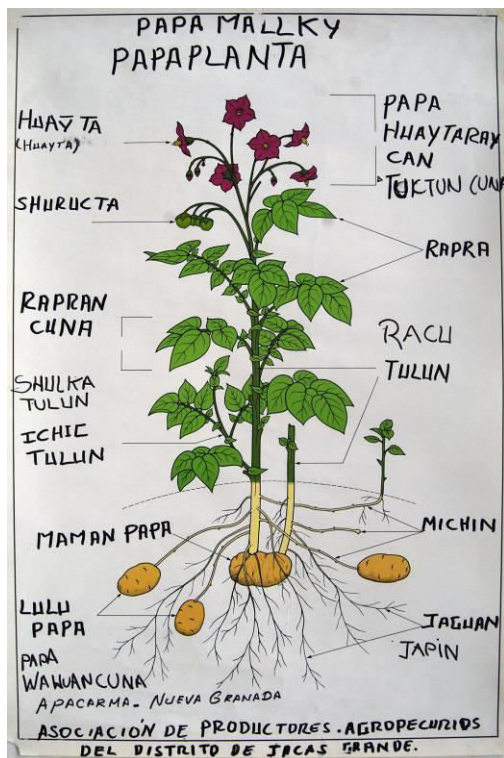
Principally, *Diaconía* works with associations of small-scale farmers, that include several villages each. Distributed over the growing season, *Diaconía's* assistance consists primarily of one-day workshops at the various villages, conducted generally during the mornings in the classroom and during the afternoons at the potato field. Localities of the associations, village community rooms,

classrooms at schools, and even open-air spaces serve as classrooms. Potato fields are available nearby.

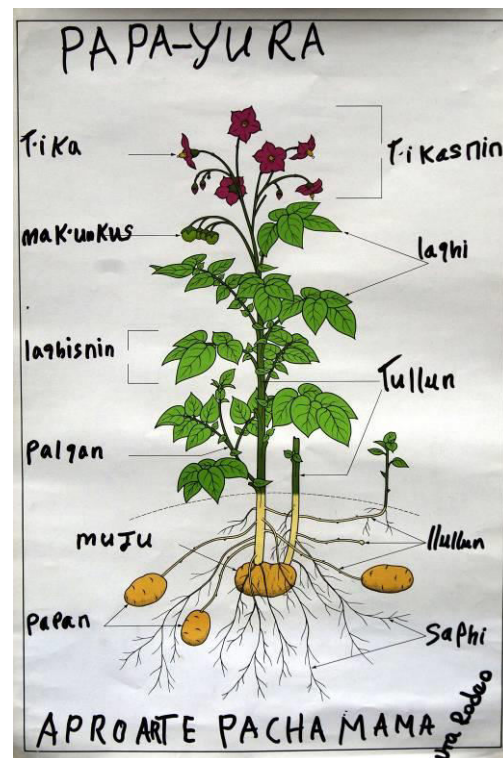
The workshops usually begin with a recognition of the potato plant. Although farmers know their plants, they are generally unaware of the relationship between the health status of foliage and tubers, and vice versa: an infestation on the foliage passes directly onto the tubers, and diseased tubers used as seed produce diseased plants. This cycle is especially serious with virus diseases that cause "degeneration" of potato seed. Degeneration can be understood and resolved by knowing the morphology and physiology of the potato plant.

A potato poster produced by the International Potato Center helps farmers identify the parts of the potato plant in their own Quechua language. Volunteers write the Quechua names of the plant parts onto the poster under lively interaction of all participants. The Quechua indications vary from one village to the next.

The potato poster serves for an explanation and discussion of the relationship between the different plant parts and the importance of producing healthy tubers. It also helps to discuss the possibility of multiplying potatoes by "true potato seed" and stem cuttings - in theory and in practice in the field.



Potato poster in Perú



Potato poster in Bolivia

After the recognition of the potato plant, an exercise on participatory problem diagnosis follows. The assistance to farmers must be based on relevant problems. For this reason, the workshops include at the outset a participatory diagnosis of problems as perceived by farmers. Farmers identify their problems by naming them individually on paper, answering the question: „What are the major problems in potato cultivation?“

All participants engage again in lively interaction, and with the assistance of volunteers, farmers group the problems into categories. The following subjects needed to be addressed:

Late blight (*Phytophthora infestans*), virus diseases and virus transmission, positive and negative selection, potato seed plot technique, true potato seed, stem cuttings, other potato disease (potato wart, *Erwinia*, ...), principal pests, physiological development of the potato tuber, seed potato storage under diffuse light, stem density.

Theoretical classes and practices in the field help to clarify these subjects.



Farmers specify their problems in writing ...



... and organize them according to importance



Theoretical classes ...



... and field practices clarify the problems

Conclusion

Exact data on number of participants are not available. As can be appreciated on the pictures, on average, ten farmers - women and men - were present. Over the years, some hundred participants assisted the workshops.

Also Diaconía learned from its interaction with farmers:

- Training and technical assistance are necessary
- Agriculture requires constant training throughout lifetime
- Many farmers lost the habit of learning
- Attention to farmers need a long term and continuous commitment
- Many farmers do not have access to technical information
- Training and technical assistance need to be adjusted to the availability of farmers' time

The importance of native potatoes and the relevance of farmers' contribution to *in situ* preservation of biodiversity merit the continuation of training and technical assistance for seed production of native potatoes in Perú.