



Andean 'lost grains' in Bolivia and Peru

In Bolivia and Peru, traditional grains such as quinoa, amaranth and cañihua, which are highly nutritious and have been cultivated for thousands of years in the high altitude plains, are being displaced by global cereal crops such as wheat and maize. Lack of improved varieties, arduous cultivation and processing, poor access to markets, and a negative image of these ancient grains as 'food for the poor' all contributed to their decline. Bioversity International began to transform the future for Andean grains with high-performing varieties, improved production and processing methods, strengthened market links, and promotional campaigns. This led to increased cultivation, market opportunities, and consumption of the traditional grains, dramatically improving the incomes and nutrition of poor farming families and their communities.

Key highlights and results

- Six improved varieties of Andean grains were developed and adopted by farmers across Bolivia and Peru, including the first ever improved variety of cañahua.
- Between 2001 and 2010, cultivation of traditional and improved Andean grains increased by nearly 132% in Bolivia and 69% in Peru.
- Consumption of Andean grains by project participants increased by 13% in Bolivia and 44% in Peru, improving household health and nutrition.
- Women were actively engaged as key stakeholders in the Andean grain value chain, particularly in terms of processing, contributing to increased consumption.
- In Bolivia, the use of two new threshing machines reduced processing time by 17 times, contributing to greater incomes for farmers and processors. Sales of Andean grains increased by 81% in Bolivia and 64% in Peru.
- New market opportunities led to increased income among producing households compared to other rural areas, contributing to enhanced diets, education and livelihoods.

New market opportunities for farmers with Andean 'lost grains' in Bolivia and Peru

The Andean region is one of the poorest in Latin America, with the highest poverty levels found in the Bolivian-Peruvian plateau. Malnutrition rates in young children range from 10-50%. Diets are based mainly on plants, with traditional grains, such as quinoa, cañahua and amaranth, playing a vital role in household food and nutrition security, as well as local livelihoods and agricultural biodiversity. In recent years, however, the benefits associated with these grains have come under threat from global trends, such as the standardization of agriculture and food.

Wheat, rice and maize-based convenience foods have rapidly replaced traditional Andean grains, which are rich in protein, vitamins and minerals. This has contributed to micronutrient deficiencies, which are often linked to a lack of dietary diversity, with significant consequences for health and human development. The decline in traditional grains has also reduced livelihood options, particularly for the poor. Cultivation of traditional grains has become increasingly uncompetitive, hampered by a lack of improved varieties, arduous cultivation practices, difficulties in processing, poor access to markets, and a negative image in poor rural communities as being 'food for the poor.' This is also having a detrimental impact on agricultural biodiversity in the region, which is crucial to maintaining the crops' ability to adapt and evolve to changing environments, such as increasing climatic variability and new diseases, pests and parasites, and is critical to the sustainable production of food and other agricultural products necessary for food and nutrition security.



Farmers grow different varieties of quinoa across a diverse landscape in Lake Titicaca, Bolivia
Credit: Bioversity International/Alfredo Comacha

The *Andean 'lost grains' in Bolivia and Peru* project emerged from more than 10 years of work by CGIAR's Bioversity International on neglected and underutilized species, an important effort financed by the International Fund for Agricultural Development (IFAD). This work was the result of a successful joint venture with the Fundación Promoción e Investigación de Productos Andinos (PROINPA) in Bolivia, the Centro de Investigación de Recursos Naturales y Medio Ambiente (CIRNMA) in Peru, strategic players at national level, and with the informal, formal and private sector. Preparatory work involved the engagement of hundreds of smallholder farmers in the planning and later in the implementation of the project's initiatives. The project concluded that in order to improve livelihoods for the rural poor, development interventions need to be holistic, set within a livelihoods framework, and encourage collaboration between diverse sectors of society.

The project used a community-based, participatory approach for increased demand for, and use of, Andean grains by developing and disseminating improved varieties of quinoa and cañahua, improving processing technologies, and promoting consumption of Andean grains through better marketing strategies. Together, this work increased yields, incomes and nutrition for poor farmers and their communities, and contributed to the protection of agricultural biodiversity.

Addressing the need for improved varieties

One of the most significant bottlenecks in the cultivation of Andean grains is that many of the local varieties lack the qualities demanded in the marketplace. In the case of quinoa, markets are interested in a small number of large grain varieties, despite great genetic variability in terms of plant and grain color, size and resistance to adverse factors, and yield, leaving a far greater number underutilized and undeveloped.



Quinoa varieties conserved by Doña Adeleiva Castillo, a custodian farmer that conserves 120 varieties of quinoa on her farm in the Peruvian Andes
Credit: Bioversity International/Alfredo Comacho

This project implemented numerous workshops with local stakeholders and several hundred selection trials, assessing a large number of plants and selecting the best performers according to farmers' preferences. Over a 10-year period, this led to the successful development and release of six improved types of quinoa, including one type that is free of saponin, a bitter covering which must be removed from the grain before consumption. Also, the first-ever improved cañahua cultivars were released. Over the course of the project, the number of traditional and improved grain varieties that were cultivated increased by nearly 130% in Bolivia and 70% in Peru. To ensure the ongoing supply of these varieties, farmers received training in high-quality seed production, which is now

being independently implemented by several local farmer associations.

To prevent the loss of local varieties and sustainably conserve the region's agricultural biodiversity, the project collaborated with local partners to document both cultivated and wild types of the three target crops, as well as the indigenous knowledge associated with them. Preserving the wide genetic variability of these Andean grains will enable the development of improved varieties that are adaptable to different environments and resistant to climatic stresses, pests and diseases.

In Bolivia, the project collected 220 types of quinoa and 83 of cañahua and stored them in national seed collections. In Peru, the project contributed to the largest amaranth collection in the Andean region – with 249 'accessions' (individual plant types, as defined by their complete DNA sequences) from nearly 40 locations. Under the project, the first ever 'descriptors list' for cañahua was developed, standardizing the characterization of the collections and promoting use by farmers and breeders.

Small-scale processing

The difficulty and drudgery involved in post-harvest processing of traditional grains has contributed to the decline in their popularity. One component of this project focused on developing low-cost innovations to address processing challenges. Quinoa, for example, is coated in a bitter, unpalatable substance called saponin. Women are responsible for removing it, which is traditionally done by hand and is extremely time-intensive. During the planning stages of the project, women confirmed that the time required to remove saponin was a contributing factor in the marked decrease in quinoa consumption. Working in close collaboration with the farmers, more efficient, practical and safe processing machines were created, combining both traditional and modern technologies. The resulting saponin-removing machine reduced the time to treat 30 liters of grain from 6 hours to 15 minutes, 24 times faster.

In Bolivia, Bioversity International worked with farmers to develop two threshing machines, which reduced processing time for quinoa by 17 times. What once took 2 hours now takes 7 minutes.

Another important achievement was the development of a prototype, by project partners, of a safe and effective continuous popping machine, which allows for processing of 30-40 kilograms/hour of amaranth grain. The project was able to dramatically reduce contamination levels by identifying the benefits of replacing the popping machine lids (made from lead) with new lids made from Teflon. This innovation, now adopted in Peru and Bolivia, has resulted in greater food safety for the millions of people using popped amaranth. Special attention was also given to control of pests and diseases. Using a combination of traditional and modern methods, the project identified best practices that reduced pesticide use by 50-90%. The project produced and published manuals on amaranth production methods, the first ever in Bolivia and Peru, which are being used to inform other initiatives.



Bioversity International works with local partners to conserve a wide range of grain varieties in the Andean region
Credit: Bioversity International/Alfredo Comacho

Previously, processing machines were only viable for use by large-scale operations. Now, the new machines are being used by small-scale farmers. Use of these machines has empowered its users – women in particular – by enabling them to dedicate time to other activities such as value addition. As a result, they are earning more money and improving their incomes, purchasing power and social status.

Market potential to increase consumption and improve nutrition

To promote consumption of Andean grains, the project facilitated strategic alliances with private companies to develop new and desirable food products, and to increase public knowledge of the high nutritional value of the crops. Through the project, over 40 products have been developed using the three grains, including meatballs, cakes, juices and pancakes, all now available in supermarkets. Fortified cookies and dairy substitutes, with an Andean grain base, are now being provided to breastfeeding women in government programs. Collaboration on amaranth revealed its suitability for the development of specific food products, including energy bars targeted at children in the Bolivian-Peruvian plateau range, where child malnutrition rates are as high as 50%. The bars have now been included as a nutritious snack in the school feeding programs of several cities and have generated around US\$400,000 for the amaranth value chain.

Surveys in Bolivia found that 70% of people were completely unaware of the nutritional benefits of Andean grains compared to other cereals. Traditional as well as new and alternative recipes using the grains were used in promotional campaigns to emphasize the nutritional benefits of the crops. Women are generally responsible for families' diets, so engaging and appealing to them as key stakeholders was an integral part of these initiatives. Over the course of the project, consumption of traditional grains increased by 13% in Bolivia and 44% in Peru among those participating.

Removing the stigma of Andean grains as 'food for the poor' has been a vital element in boosting consumption. Project partners worked with a well-known Bolivian coffee-shop chain, Alexander Coffee, to implement a campaign to promote consumption and enhance the public image of these grains. This included leaflets, posters and food items prepared by the Alexander Coffee chefs. The food items have proved very popular, with spill-over effects in other shops. This also promoted direct links between the coffee-shop chain and farming communities for supply of the raw material.

Expanding Andean grains for sustained development

There are a number of social, economic, nutritional and environmental benefits to increasing production, demand and consumption of Andean grains. Moving forward, it is important to establish a sustainable strategy to take advantage of these benefits, particularly in a way that allows small-scale farmers to engage in the value chain.

To create and strengthen linkages, the project developed multi-stakeholder platforms for quinoa, cañahua and amaranth value chains, involving small-scale farmer associations, research institutes, policymakers, development agencies and non-governmental organizations. This enabled best



Sales of Andean grains have increased by 81% in Bolivia and 64% in Peru

Credit: Bioversity International/Alfredo Comacho

practices, methods and approaches from the project to be incorporated into other initiatives and influence change. In Bolivia, the amaranth platform contributed to important policy changes, successfully lobbying for the approval of the National Bolivian Amaranth Development Plan. To further develop national and international markets, the creation of quality standards is crucial. To this end, the project developed technical regulations that set out the requirements regarding commercialization of quinoa and cañahua. These have removed potential export barriers and are facilitating access of Andean grain products to international markets. The project has already seen sales of Andean grains increase by 81% in Bolivia and 64% in Peru.

The Andean 'lost grains' in Bolivia and Peru project enhanced the livelihoods of the rural poor, contributing to increased incomes, improved health and nutrition, enhanced agricultural biodiversity, and women's empowerment. The project also enabled Bioversity International to develop knowledge products about the needs, opportunities and benefits of sustainably using and safeguarding neglected and underutilized species. This helped build the capacity of local organizations to take the lead in empowering small-scale farmers in the communities they serve.

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The following donors have supported this research

- Alianza Cambio Andino
- CGIAR Research Program on Policies, Institutions and Markets
- European Commission
- The International Fund for Agricultural Development (IFAD)

Additional information and resources

- Bioversity International website: www.bioversityinternational.org
- Bolivia: Crazy for Quinoa, video: <http://bit.ly/1Jn7lmn>
- CGIAR Research Program on Policies, Institutions and Markets, which supports this research: : <http://www.pim.cgiar.org/>
- NUS Community Website: <http://www.nuscommunity.org/>

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This Bioversity International case study brief has been produced by WRENmedia.

