

> TERRITORIAL DEVELOPMENT

Quinoa: a catalyst for innovation

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High genetic diversity
within *Quinoa real*.
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The International Year of Quinoa (IYQ) in 2013 celebrates this Andean plant for its potential contribution to the fight against hunger and poverty. The development of this sector can also have a territorial impact, depending on the context and on the accompanying process, as shown by the comparison between the Salars region in the south of the Bolivian Altiplano, the Central Chile region and the Mapuche region in southern Chile.

The United Nations General Assembly declared 2013 the “International Year of Quinoa”, following a proposal by the Plurinational State of Bolivia to FAO, in recognition of the Andean peoples who have managed to preserve quinoa as food for present and future generations. It thus acknowledges the role that quinoa’s biodiversity and high nutritional value can play in providing global food security.

Quinoa (*Chenopodium quinoa* Willd.) is an annual plant that originated in the Andes. Its nutritional value lies in the presence of proteins (all the essential amino acids), trace elements, vitamins, linoleic acid (omega-3) and amylases, and in the fact that it contains no gluten. Its broad genetic diversity means it is adaptable to many different soil types, including saline soils, and to environments covering wide ranges in terms of humidity (from 40 to 90%), altitude (from sea level to 4 500 m) and temperature (from -8°C to 38°C). This adaptability is an advantage in view of climate change and the salinisation of agricultural land.

Since the 1980s, quinoa has experienced a boom, with an increase in regional and international demand. In the Andean countries, it remains a staple food – Bolivian consumption continues to grow, and absorbs 50% of production. In North America and Europe, it is increasingly appreciated as a healthy, organically produced and fair trade product.

To meet demand, production has more than doubled in Bolivia, the leading producer along with Peru, while in Chile, initiatives have been launched to develop and promote this marginal crop.

What impact is this boom having on territorial development? The comparative study of the Salars region in the south of the Bolivian Altiplano, the Central Chile region and the Mapuche region in southern Chile shows that the quinoa sector can, depending on the context and the type of accompanying process, either structure or weaken the regions in question.

Structuring organisational models in Bolivia

In Bolivia, quinoa is produced mostly in the Salars zone, an area with the extreme environmental conditions of a high altitude desert. It is the only plant food that can withstand such conditions.

> The quinoa boom has benefited the region thanks to international demand and collective action.

The quinoa boom has had a significant impact on the 20 000 households involved in its production, processing and sale. Income has increased, which has encouraged some migrants to return. Many small farms have been maintained, particularly through pluriactivity.

The development of the sector has benefited the region due to a favourable context (international demand), to the dynamism of producers who have organised themselves, and also to support from NGOs and researchers, who have helped to express and resolve conflicts, to consolidate certain initiatives and to transform these into collective action.

International recognition of organic farming, which was already the de facto practice, has encouraged producers to join together in cooperatives in order to share best practices and the costs of certification. Next, the focus on fair trade led them to think about the collective management of local resources based on fair access and benefit sharing.

> Fair trade leads to discussions on access to resources and benefit sharing.

The producers, organised since 1983 within the National Association of Quinoa Producers (ANAPQUI), have invested a portion of the sector's profits in production (tillage equipment, seeds) and processing (generating new jobs), as well as in local infrastructure (roads, schools, health centres, telephone booths, etc.). Thanks to the creation of local services in the villages, the exodus of young people has slowed down and the population has stabilised. The generic appellation *Quinoa real* has enabled the continued production of more than 25 farmers' varieties (landraces) and has prevented the standardisation of the product as well as the homogenisation of agronomic and cultural practices, which would have weakened the cropping systems.

However, the shift from a subsistence economy to a market economy has accelerated the breakdown of community organisation, which previously managed land and collective access to resources. Conflicts have emerged: when farmers wishing to mechanise quinoa production attempted to move into the plains that had until then been used for llama and alpaca breed-

ing; when former migrants asserted their ancestral rights to land; or when families decided to extend their cultivated areas and to shorten fallow periods.

In order to facilitate the expression of points of view, to discuss sticking points and to identify consensus solutions, discussions have been launched with local producers and actors (cooperatives, NGOs, private companies and public institutions). These have been supported by EQUICO, a multidisciplinary research-action project (agronomists, ecologists, geographers, sociologists and economists) in cooperation with AVSF (Agronomes et Vétérinaires sans Frontières). Participatory workshops have been organised to collectively build a sustainable vision of agriculture. This regional prospective study has revealed the foundations of the changes underway and a new spatial organisation between production, services and living areas. Through a role playing game, the stakeholders presented their problems, whether individual or collective, and then discussed these: pluriactivity and mobility systems, production standards, the extension of cultivated areas and the inheritance of family land, etc. The construction of this joint prospective study has focused initiatives towards a shared territorial vision. Traditional practices have been adapted to the new system; the institutions guaranteeing stakeholders better control of the sector have been strengthened; and communities and agroecosystems have thus seen their resilience increase.

Alternatives in an adverse setting in Central Chile

The Bolivian dynamics have encouraged initiatives aimed at export in northern and central Chile. In the north, the Altiplano is the leading quinoa-producing region in terms of surface area. The social and environmental context is similar to that of the south of the Bolivian Altiplano. However, the Aymara communities have not organised themselves in order to export, and have remained dependent on the Bolivian cooperatives. To remedy this, the Colchane municipal council (Jura Marka association) and the QuinoaCoop cooperative have each launched an initiative to organise producers. But these initiatives have been built upon special links between the mayor or a researcher and the leaders of one community or

Territorial coordination for quinoa in the Mapuche region

• another, thereby excluding the others. Today,
• the Chilean Altiplano is dotted with ghost
• towns, and Aymaras seeking jobs are forced
• into ghettos on the outskirts of Iquique, the
• regional capital.

• However, in the Central Chile region,
• known for its monoculture for export, a trend
• has emerged from an adverse setting. Quinoa
• is grown in the dry coastal areas (Secano
• Costero), the poorest part of the country,
• by smallholder farmers on poor and degraded
• land, mainly for family or local consumption.
• With plans to export, six “large” quinoa produc-
• ers have created a private enterprise, Agrícola
• Las Nieves Ltda, based on the Las Nieves
• cooperative. They have thus obtained
• public funding to equip a processing chain
• and to organise export sales. The producer-
• shareholders (8-10 ha on average) have set a
• price 1.5 times higher than that of the members
• of the former cooperative (1-3 ha) and 3 times
• higher than that of the smaller and isolated
• producers (1/4 to 1 ha), as well as dividends. In
• addition, in order to homogenise production,
• facilitate mechanisation and maximise its profit,
• the company has distributed only one seed
• variety, which will weaken production in the
• medium term.

> The need
to associate
all local actors
with discussions
became clear.

• How can small producers be helped to over-
• come this situation in a neoliberal economic
• context? First, researchers from the IMAS
• project (see box p. 4) joined social workers in
• the area. They brought together farmers from
• the quinoa-producing regions from the north
• to the south of Chile around a role playing
• game. From the dialogue initiated, it became
• clear that the equally disadvantaged indigenous
• communities maintained strong social links and
• pooled their efforts. The small producers from
• the Central region reacted. Organised in an
• association, they decided to stabilise their pro-
• duction systems for the domestic market, espe-
• cially that of Santiago some 200 km away,
• instead of engaging directly in export. They
• have also launched a simplified process for self-
• certification of their organic produce for direct
• sales and are setting up mobile processing units.

> Alternatives
to the agricultural
export model
are possible.

• Thanks to the involvement of different
• categories of producers, local actors (decentral-
• ised departments of the Ministry of Agricul-
• ture, local authorities, cooperatives) and
• researchers from the IMAS project, the discus-
• sions launched helped to understand the con-
• flicts and to identify leverage for local
• development, and to thereby develop an alter-
• native to the agricultural export model.

In southern Chile, quinoa, or *darwe* in the Mapuche language, is an ancient plant that is conserved by women in their home vegetable gardens. It is still grown in association with local market gardens using traditional agroecological techniques. Each farmer sows on average three local varieties (landraces), some of which are rare, such as Mapuche black quinoa. The *curadoras* (guardians of biodiversity) form networks, organise local seed fairs, the *trafkintu*, raise awareness among young people and pass on to them their knowledge of plant biology, seed practices and the importance of conserving plant diversity.

For more than 15 years, the NGO CET-Sur has been helping the Mapuche to identify, collect and disseminate local varieties, to exchange knowledge and techniques, and to rediscover traditional practices. Working with the communities, it has developed a self-certification protocol for short distribution channels, which guarantees the authenticity of Mapuche quinoa on local and regional markets and for chefs. The association of actors involved or concerned – producers, Mapuche communities, municipal employees, local tourism operators, researchers, etc. – marks a new form of governance. The centre for Mapuche innovation and entrepreneurship (CIEM) is a step in this direction: its steering committee for projects associates the Mapuche communities, researchers and NGOs.

Despite this progress, the Mapuche territory, which has become disjointed over the course of many conflicts with the central power, has not managed to build a shared vision of its future. The IMAS project got involved in order to support CET-Sur in reflecting on the issue. It emerged from these discussions held with the Mapuche that regional construction must be based on diverse values, whether social (mutual assistance, barter, etc.), cultural (cosmogony, rites, cookery, etc.) or agricultural (adaptation of varieties, association of species in crop rotation, biological pest control, fertility management, etc.); values contained in the Mapuche agroecological practices. To support this community of practices, CET-Sur organises experience sharing and experiments in rural areas, as well as the pooling of services (training, processing, marketing) for quinoa. In view of the diversity of local initiatives, it promotes their complementarity.

A few words about...

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From 2001 to 2008, he worked on sorghum biodiversity in Mali and Burkina Faso. He then set up the IMAS project (ANR-AAP-Biodiversité, imas.agropolis.fr/, www.quinoa-chile.cl/), which he coordinated from 2008 to 2012. During this period, he held a visiting professorship at the Institute of Geography, PUCV (Pontificia Universidad Católica de Valparaíso, Chile).

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Initially technical and economic, the accompanying process thus moved towards the recognition of a product marked by the Mapuche identity and of associated practices, and then towards knowledge sharing, fostering a form of governance that associates different actors.

Quinoa, a model crop

The quinoa boom in the Andean countries is the opportunity to analyse the territorial dynamics in real time. The comparative analysis presented teaches us a great deal about the impact a sector can have on the development of a marginalised area. Organic production systems or those based on agroecology are possible, and can also be recognised on the domestic market. The sector can then serve as a lever for new relationships between family farms and markets, providing an alternative to the conventional agricultural export model. Collective action makes it possible to go beyond the scale of the farm in order to plan the integration of agricultural innovations into the region and to

consider a renewed connection between agriculture and society. The discussions on the spatial organisation of production are changing the future of the territory. A shared understanding of the problems and the support of local actors in the construction of a territorial project are the keys to success. These can be facilitated by a mediator from a local organisation, an NGO or a research institute to produce and present scenarios before discussing their impact on territorial development. Another lesson is that territorial governance must take into account the governance of the sector.

Beyond the prospects provided by the quinoa sector for territorial development, one question is raised with the extension of this crop outside the Andean countries, as encouraged by the International Year of Quinoa. Since this minor and underutilised crop could become a major crop, how can “fair and equitable” payment be guaranteed, according to the terms of the Nagoya Protocol, for farmers in the Andean countries for the plant breeding they have been carrying out for generations? <

This issue of *Perspective* is based on the results of the IMAS project - Impact of the methods of access to seeds on the diversity of genetic resources in agriculture (ANR/AAP-Biodiversité 2007). Coordinated by CIRAD (Didier Bazile), it has brought together a number of teams in both France (CIRAD, INRA, IRD, University of Grenoble) and Chile (UNAP, CEAZA, PUCV, UCM, UFRO, CET-Sur, farmers' organisations, indigenous communities and NGOs). The project has benefited from a constant dialogue with the ADD-EQUECO project, coordinated by Thierry Winkel (IRD), which dealt with the sustainability of agricultural systems in the south of the Bolivian Altiplano following the emergence of quinoa in global food trade.

Among the publications, see:

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proyecto internacional IMAS a través de una perspectiva por escenarios usando una metodología de “juego de roles”. *Tierra Adentro* (Chile) (97): 48-54. www.inia.cl/wp-content/uploads/revista_tierra_adentro/TA97.pdf

• Fuentes F. F., Bazile D., Bhargava A. et Martinez E. A., 2012. Implications of farmers' seed exchanges for on-farm conservation of quinoa, as revealed by its genetic diversity in Chile. *The Journal of Agricultural Science*, 150 (6):702-716. <http://dx.doi.org/10.1017/S0021859612000056>

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