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Current situation and prospects of the quinoa sector in Bolivia

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Abstract

We analyze the quinoa sector situation and prospects in Bolivia, based on both secondary and primary information sources (i.e. surveys of producers and interviews to key actors).
The quinoa sector has sustainability problems in production, market shares and price volatility. However, this grain – specifically the royal quinoa from the Southern Altiplano – has great potential to remain in the world market within niches that value organic or regenerative production, as well as to increase national consumption. In this regard, we believe that it is necessary to impulse the quinoa transformation with greater diversification, productive complementation and coordination between the various stakeholders. In this productive dynamics, small quinoa producers can insert themselves into the value chain, which requires the strengthening of their hard and soft skills, as well as greater technical assistance. Finally, the quinoa sector sustainability requires a comprehensive approach that includes good agricultural practices caring the environment, as well as more conscious consumption.

Key words: quinoa, quinoa value chain, Bolivia
JEL codes: D29, Q11, Q19, Q59

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Resumen

El presente trabajo analiza la situación actual y las perspectivas del sector quinuero en Bolivia, con base en fuentes de información secundarias y primarias (*i.e.* encuestas a productores y entrevistas a actores clave).
En los últimos años, el sector quinuero, ha estado atravesando problemas de sostenibilidad tanto en la producción, como en las cuotas de mercado y la volatilidad de precios. Sin embargo, este grano –específicamente la quinua real del Altiplano Sur– tiene un gran potencial para continuar en el mercado mundial dentro de nichos que valoren la producción orgánica o regenerativa, como también para un mayor consumo interno. Para esto, se debe avanzar en la transformación de la quinua con una mayor diversificación, una mayor complementación productiva y una mayor articulación entre los diversos actores. En esta dinámica, los pequeños productores quinueros pueden insertarse en la cadena de valor, lo que requiere el fortalecimiento de sus habilidades duras y blandas, como también una mayor asistencia técnica. Por último, la sostenibilidad del sector quinuero requiere un enfoque integral que incluya buenas prácticas agrícolas para el cuidado del medio ambiente, como también un consumo más consciente.

Palabras clave: quinua, cadena de valor de la quinua, Bolivia
Código JEL: D29, Q11, Q19, Q59

I. Introduction

Quinoa (*chenopodium quinoa willd*) is an Andean grain that has been produced by Bolivians even prior to the arrival of the Spaniards. As of the 1970s, the area of cultivation of this grain began to increase considerably in the country, given the growth of its demand internationally arising from recognition and appreciation of its high nutritional value. Such a scenario allowed an improvement in agricultural income of smallholders, particularly in the Southern Altiplano of Bolivia, where quinoa production concentrated. Transformation processes also augmented, from the milling process to the production of flour, breads and pastries, and energy bars.

The quinoa sector had a boom from 2012 to 2015, led mainly by a price increase. Despite this, in later years the productive dynamics began to deteriorate in a scenario of lower yield, reduced prices, and more international competition from several countries that presently produce quinoa.

Under this context, the present work does a characterization of quinoa and of its value chain, observing its performance and future prospects for considering a greater protagonist role of quinoa smallholders. This document analyzes the variables related both to supply and demand (*e.g.*, production, yield, prices, costs, profit, sales, and exports), as well as factors related to sector dynamics (*e.g.*, transformation, differentiation, diversification, and productive complementarity), which implies evaluating the likelihood of the stakeholders involved of working jointly and in coordination. The sustainability of quinoa production is also studied.

Given all of this, secondary information is employed, together with primary information obtained from three sources: i) a survey done with 31 producers that are part of Red Quinua, which is associated with the Latin American and Caribbean Network of Fair Trade Small Producers and Workers – CLAC (which allowed obtaining information on costs, profit margins and alternatives for improving these margins); ii) interviews of key stakeholders of the value chain, for learning of the sector's opportunities and problems; iii) a questionnaire for 11 producers of Red Quinua to learn about the adequacy of their technical, administrative and soft skills for business development.

Within this complex scenario of the Bolivian quinoa sector, the grain, and particularly royal quinoa of the Southern Altiplano, has great potential for remaining in the world market and participating in new markets, such as for example countries of Asia and the Middle East. This may occur given this species' differentiating characteristics: flavor, size, color, etc. through a positioning of geographic brand, designation of origin and others, and highlighting its organic or regenerative mode of production. Besides, quinoa may be promoted in the domestic market for greater consumption. In any case, it is necessary to advance in transforming the grain with better technology.

Quinoa transformation may also be associated with greater diversification and productive complementarity through the development of products combined with cañahua, amaranth, cacao, Brazil nuts, coffee, and vegetable milk (made of quinoa and tarwi), among others. It may also be associated with processes that imply greater coordination between different stakeholders. Under

such dynamics, quinoa smallholders may enter the value chain for having better income and profit prospects, but this requires strengthening of their hard and soft skills, as well as more technical assistance. Lastly, quinoa production sustainability requires a comprehensive approach that includes best agricultural practices for caring for the environment, as well as fostering more conscientious consumption.

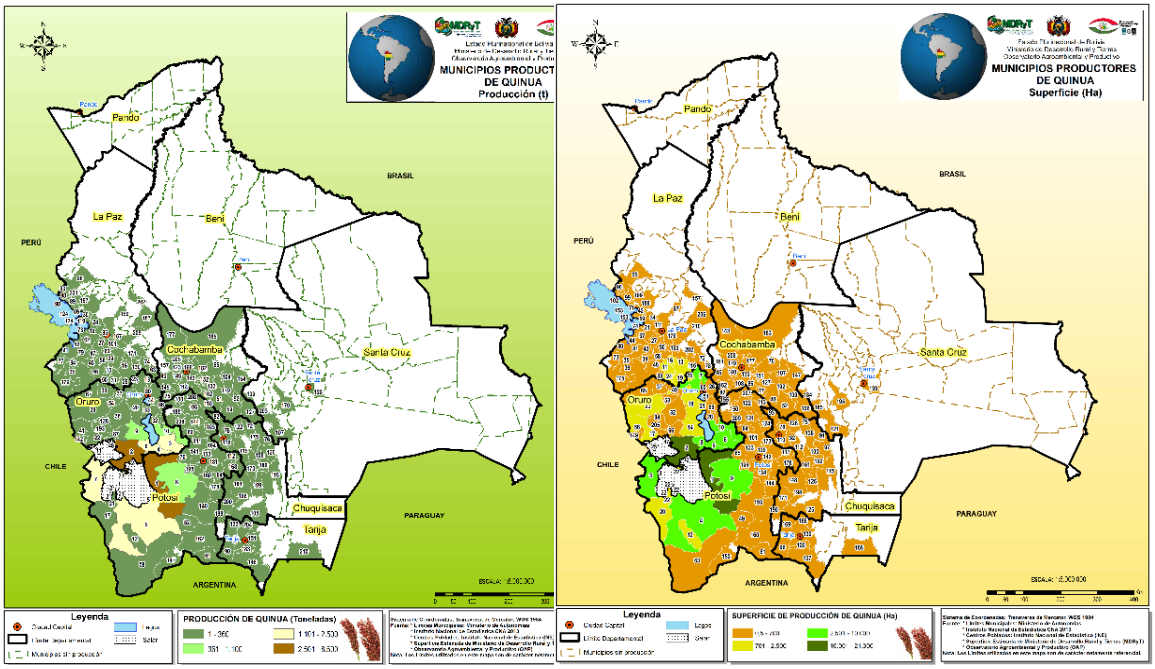
In addition to this introduction, the present study has four sections. Section II briefly describes the characteristics of quinoa cultivation and its value chain. Section III presents the performance of the quinoa sector in terms of production and yield; prices, costs and profit; and sales. Section IV evaluates the current situation and the sector's prospects. Section V contextualizes the interests and the transformation potential of quinoa from the viewpoint of quinoa producers. Finally, the last section states the most important conclusions and recommendations for strategies.

II. Characterization of the quinoa crop and its value chain

The Andean grain quinoa's nutritional value is highly documented in the literature. Based on its genetic variability, it has been characterized as a grain with about one thousand ecotypes, considering differences in temperature, rain, humidity, soil, and altitude above sea level, among others (Laguna, 2001). Its adequate temperature is between approximately 15°C and 20°C, though it can withstand up to -8°C, as well as higher levels of heat, depending on its development phase. Optimal precipitation is between 300 mm and 500 mm, but it can resist minimum levels of 200 mm and those above 800 mm (for a literature review, see Ajhuacho, 2023). As to altitude, its production used to be in Andean regions of high altitude, but it is presently also cultivated in regions close to sea level.

In Bolivia, production is centered in the Altiplano region of the Departments of Oruro, Potosí and La Paz (in that order). This region is divided into three zones: i) the Northern Altiplano, which includes the Titicaca Lake area of La Paz; ii) the Central Altiplano, which includes part of La Paz and Oruro; and iii) the Southern Altiplano, which covers part of Oruro, and Potosí in the area between the salt lakes (see Map 2.1). In the remaining departments of the country, production is marginal, though Gabriel René Moreno University of Santa Cruz (UAGRM) has adapted seeds to the agro-climate conditions of the region and has recently harvested tropicalized quinoa of the winter season (see, *e.g.*, Ibáñez, 2023).

The Altiplano region is divided into three zones: **Map 2.1. Quinoa producing regions of Bolivia**



Source: Extracted from Observatorio Agroambiental y Productivo (Agro-environmental and Production Observatory) (2024)

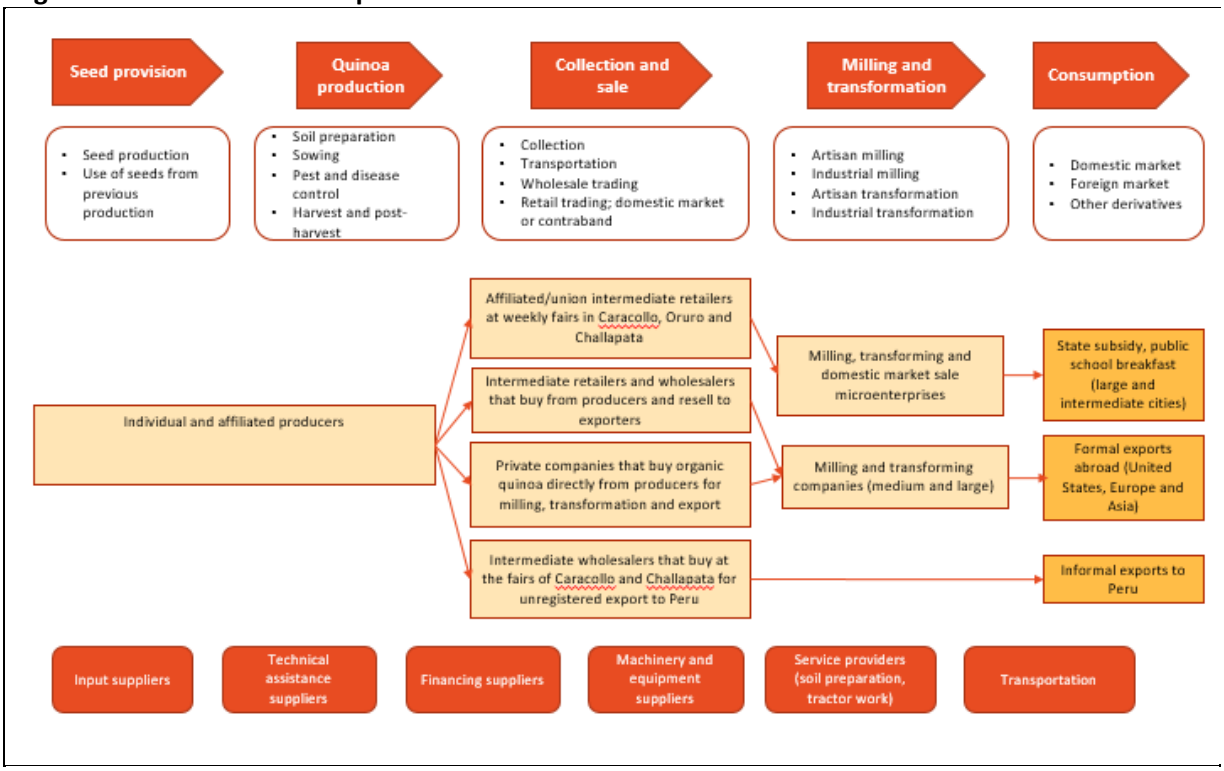
Figure 2.1 presents the value chain structure of quinoa in a systematic way. **Primary production** is done in an annual cycle and is made up of several activities, the most important of which are: provision of seeds, soil preparation, sowing, pest and disease control, harvest, and post-harvest. According to Risi *et al.* (2015), in the Southern Altiplano:

- Seeds may be traditional – *e.g.*, originating from the production of the producer families – or improved and certified. Use of the latter is still limited (see INIAF, 2018).
- Soil preparation (between February and March) may be done under a traditional system or a mechanized one. In the first case, soil preparation is manual, with human traction and support tools. In the second case, motorized traction is employed with disc or chisel ploughs[1].
- Sowing (between September and October) is done traditionally – with tools for making (fertilized) ditches until the humid soil is reached, where the seeds are deposited – and in a mechanized way, employing sowing machines.

[1] Given the limited rainfall in the Southern Altiplano, this practice allows retaining the scarce humidity available, while taking advantage of rainfall and breaking the capillarity of the soil.

- Pest and disease control is done through several prevention practices using (bio)insecticides and (bio)fungicides during plant development (Cruces and Callohuari, 2016).
- Harvesting (between April and May) is the process of cutting or uprooting the plants. It is done manually with a sickle.
- Post-harvesting includes the tasks of drying, threshing – *i.e.*, separating the grains from the panicle –, venting, removal of vegetable residue, and, lastly, storage.

Figure 2.1. Structure of the quinoa value chain



Source: Own preparation, based on the Altiplano and Inter-Andean Valleys Inclusive Markets Project, research and analysis, Swisscontact-PROFIN (2018)

The mode of primary production has evolved over time in response to changes in demand. Until the 1960s, quinoa was cultivated under a traditional system on the hillsides of the mountain ranges of the Southern Altiplano. Beginning in the 1970s, with the opening up of the international market, production of the grain expanded to the flatlands, which allowed introducing farm machinery (Laguna, 2001). In this process, organic production was differentiated from conventional production, with the former employing organic inputs, and the latter employing chemical and synthetic inputs.

Primary production is generally done by producer families that may or may not belong to organizations[2]. In this regard, it is estimated that in 2009 there were 70,000 quinoa producers in the country (Ministry of Rural Development and Land – MDRyT – and CONACOPROQ, 2009), working small units (smallholdings) of land that was private or community owned.

In terms of the **collection and sale**, the producer families designate part of the quinoa to the markets, and this portion is normally presented as bulk grain; *i.e.*, without having gone through the milling process. Another part is kept for own consumption. The primary sale involves several actors, noteworthy among which are:

- Producer associations (which sometimes group together small cooperatives and minor associations). Among other activities, these associations collect the quinoa of their affiliates and work in the value chain in the milling process, packaging and shipping (Risi *et al.*, 2015).
- Agro-export companies. They buy directly from the producers or from their associations, and have a relatively robust supplier network (Risi *et al.*, 2015). Although most of the quinoa collected by these companies is organic (certified), some companies also buy conventional quinoa in small quantities.
- Informal buyers. Their main collection center at the national level is in the Municipality of Challapata in the Department of Oruro. There, mainly at the weekly fair (Saturdays and Sundays), quinoa buyers and sellers of the Southern Altiplano meet. The quinoa there is generally not organically certified and is considered conventional.
- Wholesalers/subdividers. They operate in the local distribution channels, with the aim of selling in the domestic or informal export market of Peru.
- Domestic market retailers. They are mainly of three types: large ones, of the supermarket chains; corner stores and popular urban market stalls; and specialty stores.
- Consumers. They are, on the one part, restaurants, some of them gourmet, and food stalls; and on the other, small transformation units and the industrial or artisan level.

Milling is removing the vegetable impurities, small stones, dust, and saponin from the bulk grain[3]. This activity may be done traditionally, or in an improved or mechanized way. The traditional system employs rudimentary procedures, such as toasting and removing the peel from the grain with a stone mortar or in a spinning barrel, and the grain is then treaded and/or pounded with a stick. This form of milling may be done with low volumes; it is therefore employed mostly for own consumption and for sale in small quantities (Soraide *et al.*, 2003; Risi *et al.*, 2015).

[2] Among the most well-known organizations are Asociación Nacional de Productores de Quinua (ANAPQUI), the organizations that make up Red Quinua, and Central de Cooperativas Agropecuarias Operación Tierra (CECAOT).
[3] Saponin is an alkaloid with a bitter taste found in the outer peel of quinoa.

Under the improved system, toasting and removal of peels is substituted by a process employing truck wheels, allowing for a greater processing capacity than the traditional method, though contamination occurs from the truck fuel. The main markets for this product are the local and illegal export market of Peru (Collao, no date, and Soraide *et al*., 2005; cited in Muriel and Evia, 2011). Lastly, mechanized or industrial milling is a process that cleans the bulk grain with machines adapted from other crops, such as rice, or which are specific for quinoa[4] and possess greater processing capacity (Muriel and Evia, 2011).

Quinoa transformation begins with selecting the grains with the best size and appearance – *i.e.*, pearly quinoa – mainly for final consumption. The lower quality grains are generally for intermediate consumption in industries, for making flour, pasta, cookies, bread, flakes, energy bars, "popcorn", candies, flan, and others, for the domestic and export markets (Muriel and Evia, 2011). This activity also involves several of the actors mentioned previously, such as producer associations, industrial and agro-export companies, wholesalers, retailers, and of course consumers.

The quinoa value chain also has actors that foster its development, such as:

- Cámara Boliviana de Exportadores de Quinua y Productos Orgánicos (Bolivian Chamber of Quinoa and Organic Products Exporters – CABOLQUI).
- Government entities such as the National Institute for Farming and Forestry Innovation (INIAF), the International Quinoa Center (CIQ), the National Farm Sanitation and Food Safety Service (SENASAG), the National Intellectual Property Service (SENAPI), and the Rural Alliance Project (PAR).
- Universities, international cooperation, the Chamber of Producers of the South, PROINPA (research, preparation and sale of bio-inputs), and other civil society organizations that provide support in technical assistance, research and other actions.

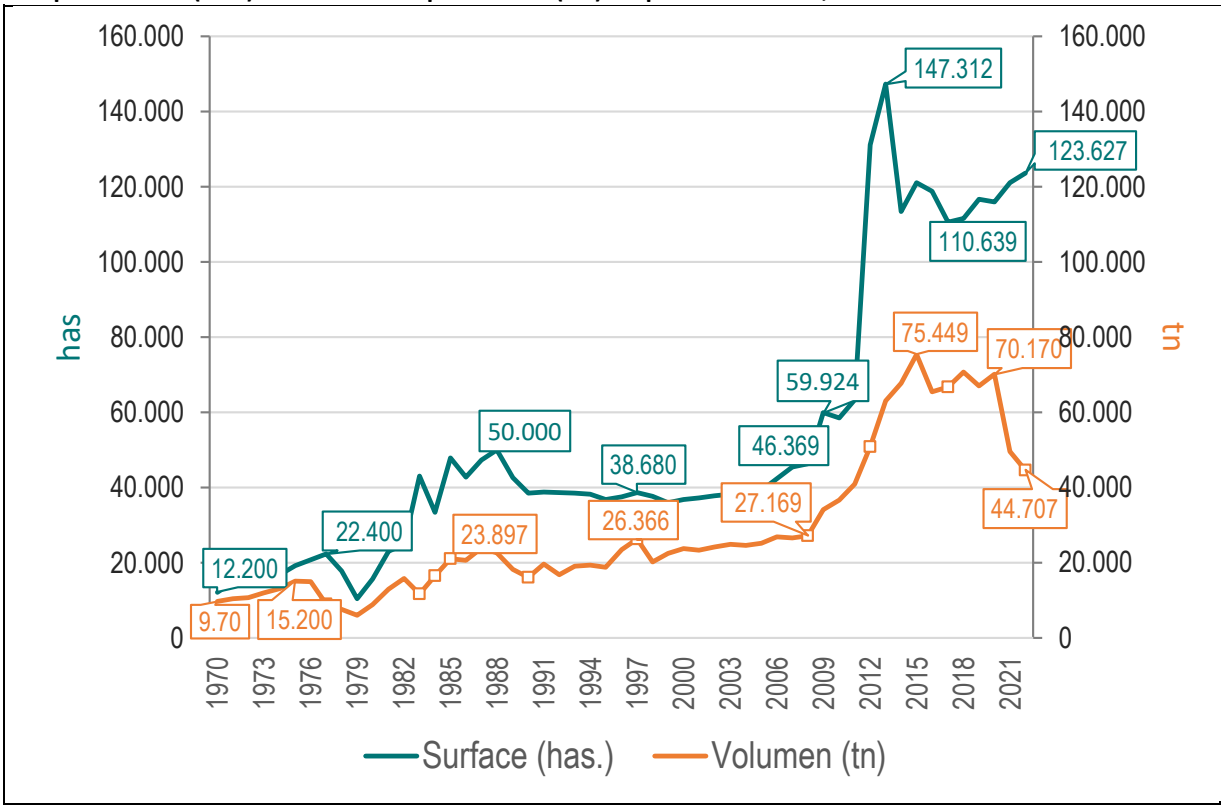
III. Performance of the quinoa sector

III.1. Quinoa production and yield

Knowledge and dissemination of the nutritional richness of quinoa generated a substantial increase in its demand, mainly abroad. This led to greater national production and more grain transformation. Graph 3.1 presents the evolution of Bolivian quinoa in hectares (has.) and metric tons (mt).

[4] Alianza de la Quinua introduced this innovation with milling companies, producer associations, and technical cooperation, allowing for a considerable increase in productivity.

Graph 3.1. Area (has.) and volume of production (mt) of quinoa in Bolivia, 1970-2022



Source: Own preparation, based FAO information (2024a)

Between 1970 and 2022, the area of cultivation of quinoa went from 12,200 has. to 123,600 has., with an average annual growth rate of 4.6%, though with sharp differences between periods. In 1970 and 1989, this rate was high (5.8%), with the sharpest increase in 1988, when the cultivated land reached 50,000 has. Between 1989 and 2008, the area dropped and then increased slightly, reaching an annual percentage increase of only 0.4%. From 2008 to 2022, there was once again an increase and the highest annual rate of growth (7.3%) was reached. The maximum value, of 147,300 has., was reached in 2013[5].

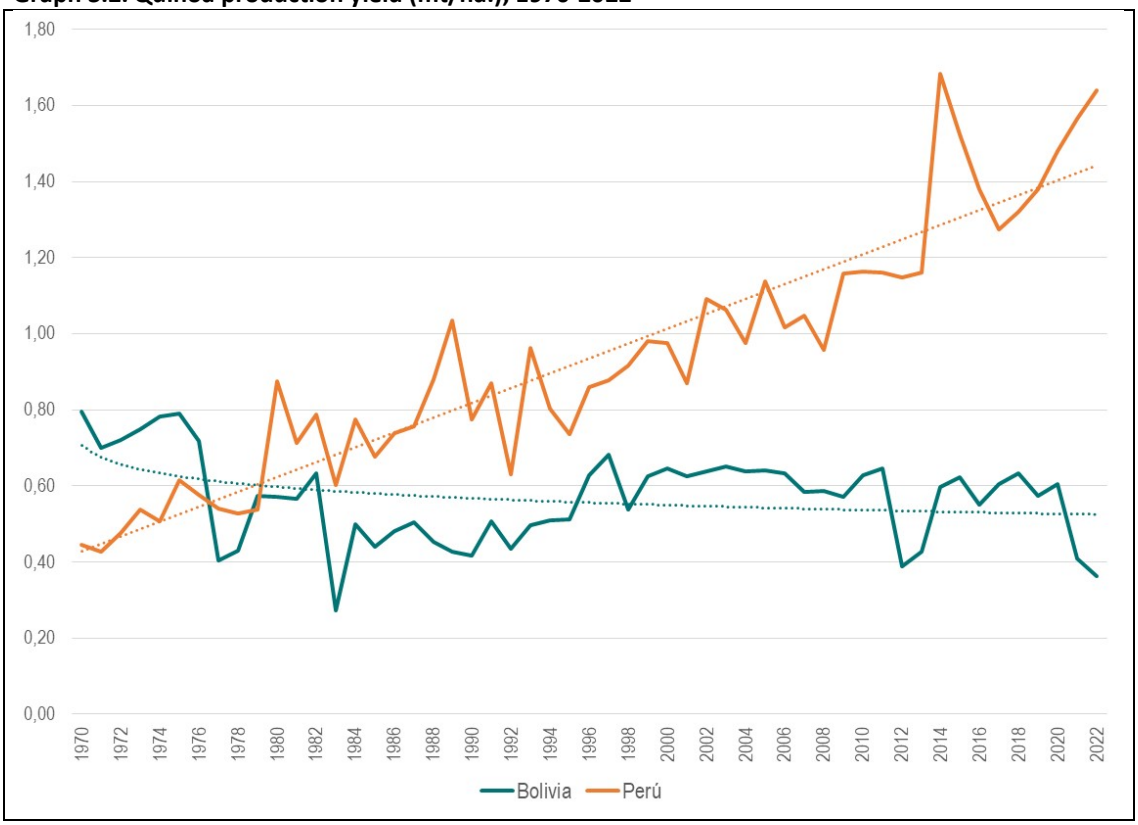
The increase in quinoa's production volume was considerably lower than the cultivated area, with an average annual growth rate of 3.0% from 1970 to 2022, going from 9.7 mt to 44.7 mt. From 1970 to 1989, the annual growth rate was slightly higher (3.4%) and from 1989 to 2008 it was lower (2.1%). In later years, the highest increase (3.6% annually) was reached, but unlike the cultivated area, the peak was reached in 2015, at 75.4 mt.

The differences between the evolution of quinoa area cultivated and production volume reflect volatility in yield (mt/ha.) with a negative trend in time. This may be observed in Graph 3.2. In the first five years of analysis (from 1970 to 1974) the average was 0.75 mt/ha., while in the last five

[5] A recent report of the quinoa market showed that in 2023 the net production volume of quinoa was below 40,000 mt and that for 2024, "the expectation is to reach 49,000 mt of processed quinoa available for the market, as a result of the rainfall in January and February, which considerably improved the prospects of the 2024 harvest in Bolivia" (Jacha Inti, 2024).

years, this figure is 0.52. The trend has a sharp drop from 1970 to 1984, recovers slightly from 1993 to 1997, and falls once again in the following years.

Graph 3.2. Quinoa production yield (mt/ha.), 1970-2022



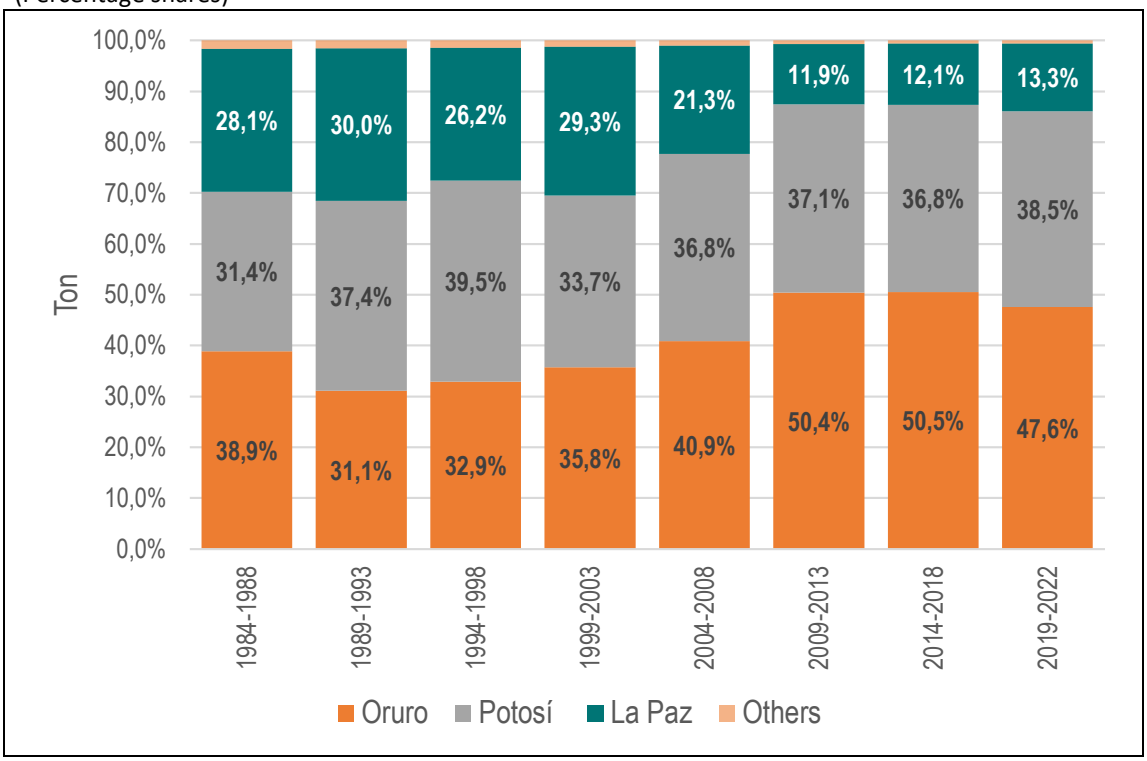
Source: Own preparation, based on FAO information (2024b)

The negative trend in Bolivian quinoa yield responds to a series of factors, among which worth underscoring (see Schneider, 2014 for a literature review) are the following: an increase in cultivated area in less fertile land, which also implied a decrease of other native species that acted as live barriers. This led to greater soil erosion, a decrease in livestock breeding activity with a corresponding scarcity of dung for producing fertilizer. Another factor is monoculture, which has been exacerbated with a reduction in the resting and fallow periods, with proliferation of pests.

Graph 3.2 also presents the yield for Peruvian quinoa for the purpose of comparison. In the first years, Bolivia's yield was higher than Peru's; from 1970 to 1975, the relation was, on average, 1.52 to 1; *i.e.*, 52% higher in Bolivia. This relation was inverted in 1979, and then land productivity in the neighboring country accelerated to reach a relation of 0.38 to 1 from 2017 to 2022. The considerable increase in Peruvian quinoa yield responds to more technical and conventional production, particularly in non-Andean zones. It also responds to better agricultural practices in the Andean zones that produce more organic quinoa (see, *e.g.*, Montero and Romero, 2017; Unidad de Inteligencia Comercial – UIC, 2020).

Graph 3.3 shows the percentage shares of quinoa production, divided by departments and five-year periods.

Graph 3.3. Quinoa production by departments, 1984-2022
(Percentage shares)



Source: Own preparation, based Instituto Nacional de Estadística (National Statistics Agency – INE) information

Oruro stands out in all periods with the highest percentage, though it undergoes a slight fall in the first two periods, then increasing to reach the maximum level of 50.5%, slightly more than half of production, from 2014 to 2018. Potosí is in second place, with a portion that increases considerably from 1984 to 1988 and from 1989 to 1993. It then fluctuates without relevant changes in trend. Finally, La Paz is in third place, with a sharp fall in its participation from 1999 to 2003 (of 29%) and from 2009 to 2013 (of 11.9%). This shows that the boom in the cultivation of the grain occurred mainly in Oruro, and to a lesser degree in Potosí.

Lastly, Table 3.1 presents the municipalities with the greatest quinoa production in Oruro and Potosí in 2022. In the case of Oruro, Salinas de Garci Mendoza held 33.7% of production (and 37.4% of the cultivated area) in 2022. On their part, the group of municipalities of Santiago de Huari, Santuario de Quillacas and Pampa Aullagas represented 34.7% (and 28.4% of the cultivated area). In terms of yield, the municipalities of La Rivera, Santiago de Huari and Santiago de Andamarca have the highest levels.

Table 3.1. Municipalities of Oruro and Potosí in which quinoa production is concentrated, 2022

Municipality	Production (mt)	Area (has.)	Yield (mt/ha.)
Oruro			
Salinas de Garci Mendoza	6,971	23,352	0.30
Santiago de Huari	2,633	5,730	0.46
Santuario de Quillacas	2,317	6,402	0.36
Pampa Aullagas	2,242	5,553	0.40
Caracollo	1,245	4,684	0.27
Challapata	963	3,004	0.32
Santiago de Andamarca	696	1,602	0.43
Eucaliptus	522	2,103	0.25
La Rivera	433	671	0.65
Sabaya	391	1,643	0.24
Others	2,290	7,618	0.30
Total	**20,703**	**62,362**	**0.33**
Potosí			
Uyuni (Thola Pampa)	11,226	22,541	0.50
Colcha "K"	2,079	6,604	0.31
Llica	2,002	6,989	0.29
Tomave	1,330	3,963	0.34
San Agustín	432	2,014	0.21
San Pedro de Quemes	357	1,019	0.35
Tahua	113	337	0.34
Atocha	54	129	0.42
Puna	23	70	0.33
Villazón	21	63	0.33
Others	160	321	0.50
Totals	**17,797**	**44,050**	**0.40**

Source: Own preparation, based on information extracted from the Production Information Integrated System (2023)

In the case of Potosí, 93.5% of quinoa production (and 91.0% of the cultivated area) takes place in Uyuni (Thola Pampa), Colcha "K", Llica, and Tomave, with Uyuni in first place with 63.1% of the department's production (and 51.2% of the cultivated area). Also, Potosí's average yield was considerably higher than that of Oruro, with Uyuni and Atocha standing out.

Lastly, in terms of the segments of organic and conventional quinoa production, the National Farm Sanitation and Food Safety Service (SENASAG, 2022) has information provided by the certification companies. It is estimated that an average of 85% (in has.) is organic quinoa cultivation and 15% is conventional, based on data from 2018 to 2020.

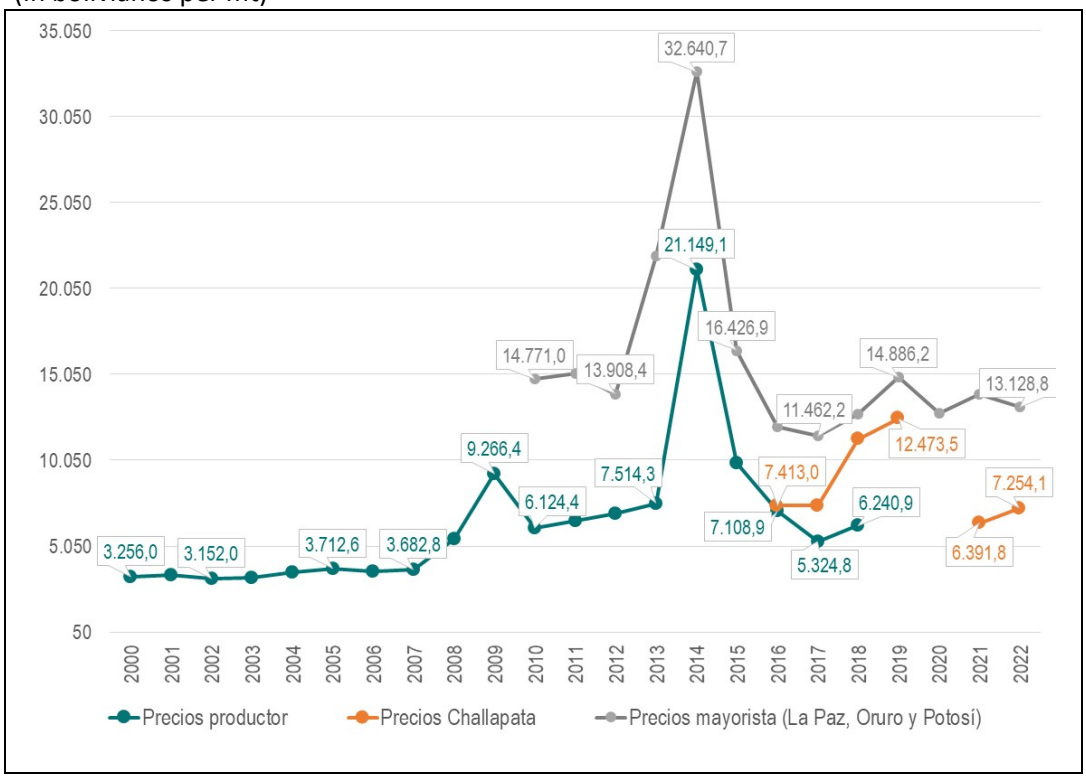
III.2. Prices, costs and profit

This subsection is based both on primary and secondary information. The primary data was obtained applying a questionnaire to 31 quinoa producers that are part of Red Quinua – which is

associated with the Latin American and Caribbean Network of Fair Trade Small Producers and Workers (CLAC) – in December 2022. This had the aim of filling secondary data gaps such as, for example, production costs, profit margins and actions for improving agriculture income from quinoa.

In terms of quinoa prices, Graph 3.4 shows that the variable analyzed (measured at the producer level) has a high level of volatility, increasing from 2007 to 2014, with a considerable increase from 2013 to 2014, going up 181.5%. Then there is a fall, and in 2018 it is at a value similar to that of 2010 (Bs. 6,240.90 per mt).

Graph 3.4. Average quinoa prices in Bolivia, 2000-2022
(In bolivianos per mt)



Source: Own preparation, based on information of the Agro-environmental and Production Observatory (2023a, 2023b) and FAO (2024c)

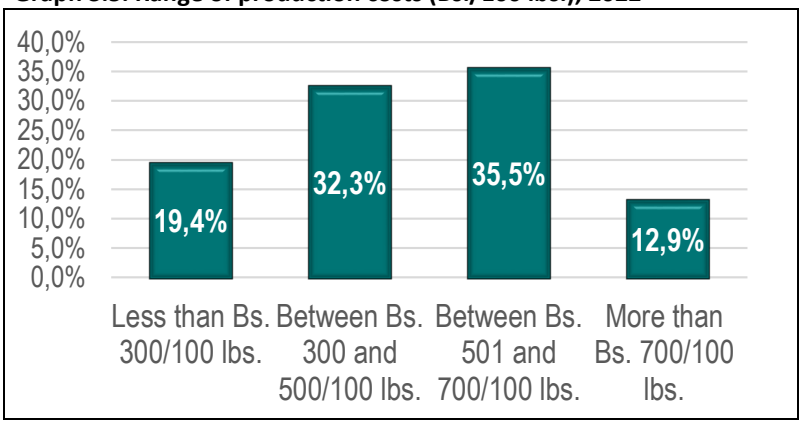
The reference price of the first phase of quinoa sales is of the market in the Municipality of Challapata, in the Department of Oruro. This price's behavior follows the producer prices, where an increase may also be observed in 2014 and a fall until 2016, after which there is high variability, with a value in 2022 similar to that of 2016 (Bs. 7,254.10 per mt)[6].

[6] In a telephone interview with the General Manager of CABOLQUI, done in December 2023, we were told that quinoa prices at the producer level had risen progressively in 2023, having gone above Bs. 15,000 per ton at the end of the year as a result of quinoa supply problems in Peru.

Lastly, Graph 3.4 shows the average wholesale prices of the Departments of La Paz, Oruro and Potosí. These prices follow the volatility of producer prices, but are, in all cases, higher; they reach 100% of producer prices on average from 2010 to 2018.

In terms of production costs, Graph 3.5 presents the values obtained from a survey of organic quinoa producers, with 35.5% of them mentioning a price between Bs. 501 and 700 per 100 lbs., between Bs. 10,891 and 15,217 per mt; and 32.5% place the price between Bs. 300 and 500 per 100 lbs. The differences observed are attributable to several factors, among which are: use of machinery and equipment, the community in which the cultivation is done and the manual labor, which is sometimes contracted as is therefore a cost, and is other times unpaid family labor.

Graph 3.5. Range of production costs (Bs./100 lbs.), 2022



Source: Own preparation, based on a survey of quinoa producers

These values have a certain relation with the production costs estimated by the Ministry of Rural Development and Land (MDRyT, 2021) in 2013[7], where under a semi-mechanized system, quinoa production costs reached Bs. 5,826 Bs./ha. in the Uyuni region, equivalent to Bs. 479/100 lbs. considering yield of 559 kg/ha. In the Municipality of Salinas de Garci Mendoza, these costs reached Bs. 8,515/ha., equal to Bs. 630/100 lbs. with a yield level of 622 kg/ha., as may be observed in Table 3.2.

Table 3.2. Quinoa production costs in Bolivia, 2013

Cost structure	Uyuni	Salinas de Garci Mendoza
Production costs (Bs./ha.)	5,826	8,515
Yield (kg/ha.)	559	622
Production costs (Bs./100 lbs.)	479	630

Source: Ministry of Rural Development and Land (2021)

[7] From 2013 to 2022, part of the differences in costs may be explained by the increase in prices of inputs and production factors. Regarding this, there is no specific data, but it may be considered that prices were low due to the behavior of the following associated variables: i) from 2013 to 2022, the average annual inflation rate was 2.6%; ii) from 2013 to 2021, average annual increase in nominal labor income was 1.9% (according to estimates from household surveys); and iii) the exchange rate was fixed, which limited price increases of imported inputs.

The difference in production costs between the two quinoa producing zones of the Southern Altiplano are attributable to the fact that in Salinas de Garci Mendoza and neighboring municipalities investment was higher because cultural and fertilizing labor were done during the development of the crops, which led to higher yield. This aspect may be observed more clearly in the general cost structures of both regions, where the greatest difference is in the use of inputs (see Table 3.3).

Table 3.3. Quinoa production cost structures (Bs./ha.), 2013

Cost composition	Salinas de Garci Mendoza	Uyuni
Manual labor	3,960.00	3,460.00
Farm machinery and/or animal traction	720.00	1,080.00
Inputs	2,257.00	358.70
General expenses	693.70	489.90
Depreciation of tools and equipment	884.50	437.50
Totals	**8,515.20**	**5,826.00**

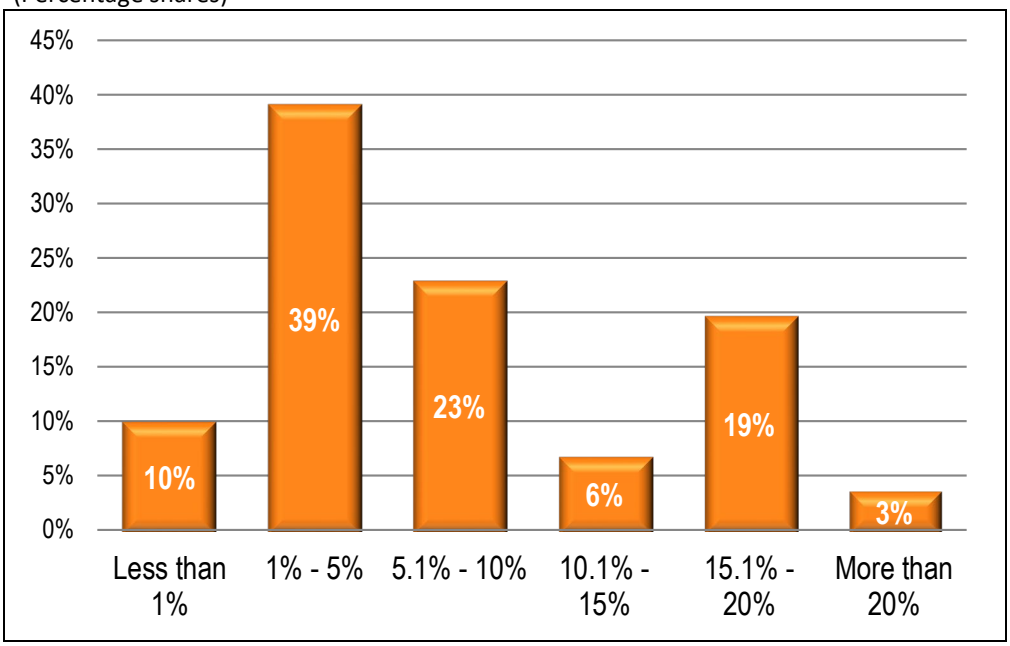
Source: Ministry of Rural Development and Land (2021)

The relationship between prices and production costs shows that the margins are low and may even be negative. Graph 3.6 shows that almost half of those interviewed had a profit margin of 5% or less, while only 3% stated having a margin of 20%.

The producers, aware of the need to improve their income from quinoa crops, took on certain actions, noteworthy among which are: production of quinoa varieties according to demand[8] (23%), in some cases together with price agreements (58% in total); price delimitation prior to harvest (16%), which may also go together with negotiation of these prices (26%) (see Graph 3.7). According to the responses, 74% of producers mentioned agreeing on or negotiating prices.

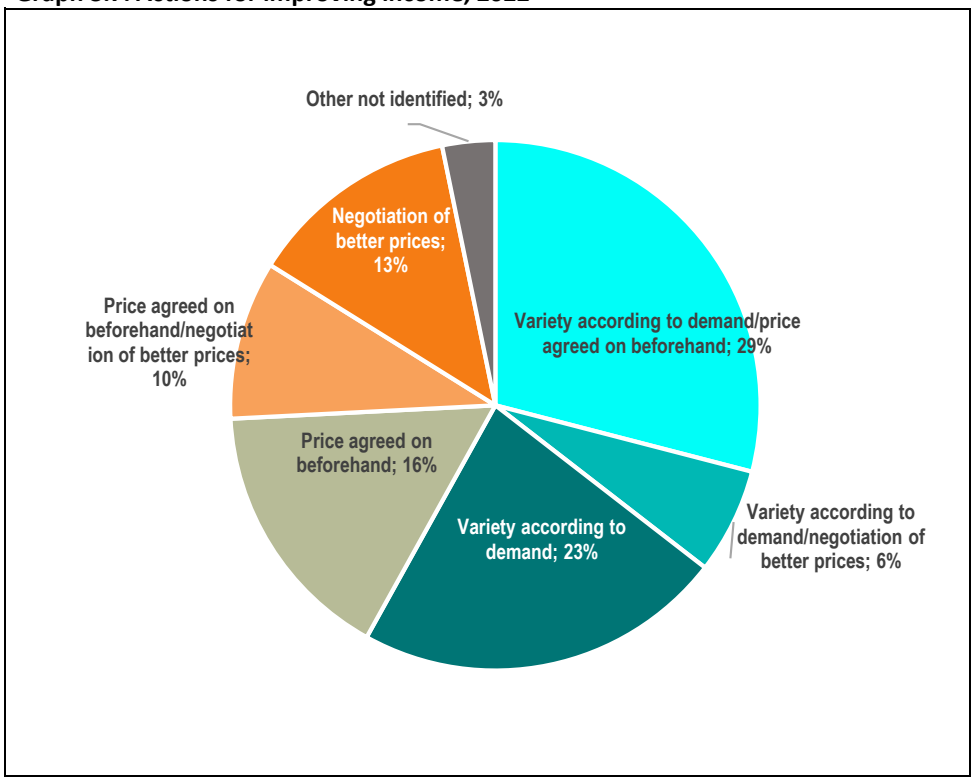
[8] The varieties imply production of white, red and black quinoa.

Graph 3.6. Profit margins in percentage of the sale value of quinoa, 2022
(Percentage shares)



Source: Own preparation, based on a survey of quinoa producers

Graph 3.7. Actions for improving income, 2022



Source: Own preparation, based on a survey of quinoa producers

III.3. Sale

As mentioned previously, quinoa is used for own consumption[9] and is destined for the domestic and foreign markets. Table 3.4 presents the destination of grain production in the country based on net production destined for the market.

Table 3.4. Destination of quinoa production, 2020, 2021, 2022, 2023, 2024

Destination	2020	2021	2022	2023(*)	2024(**)
Hectares produced	115,973	121,119	123,627	126,687	81,080
Net production	66,661	46,360	42,472	39,311	48,838
Local consumption	11,892	12,060	12,228	12,397	12,566
Exports	36,010	30,443	23,783	24,813	24,411
Contraband to Peru	16,932	9,595	5,673	16,673	16,887
Final stock at year-end	1,827	(5,738)	788	(14,572)	(5,026)
Total balance carried over	48,642	42,904	43,692	29,120	24,094

(*) preliminary; (**) projected
Source: Jacha Inti (2024)

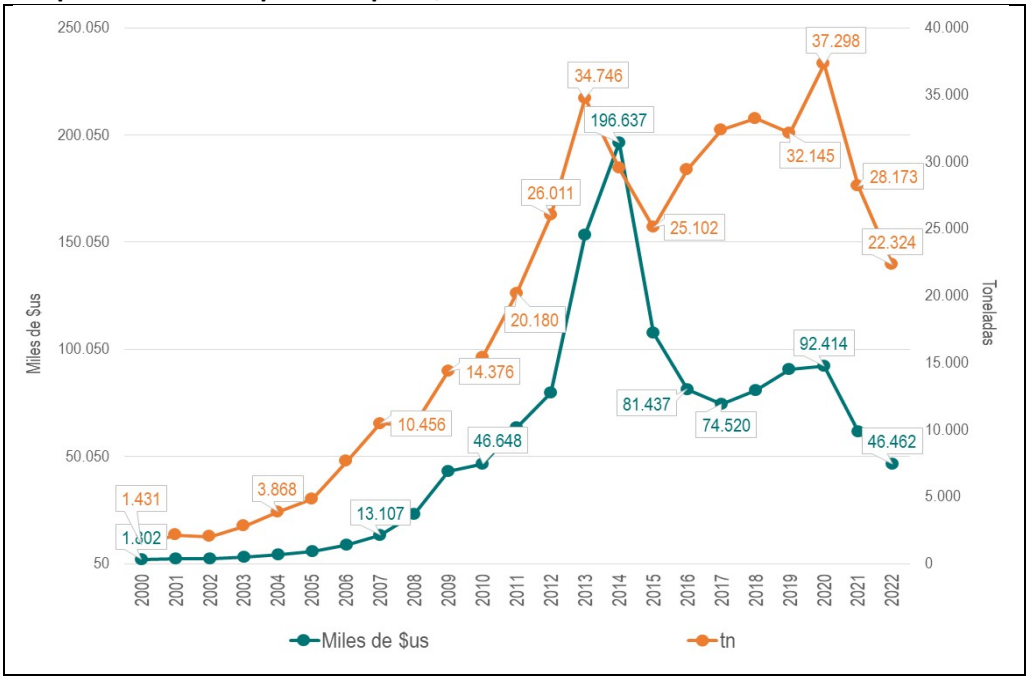
Most of net production is destined to exports, followed by sales to Peru[10], and then local consumption. A portion is yearly stock which adds to or subtracts from existing prior stock carried over.

In terms of quinoa exports, Graph 3.8 presents its evolution for the 2020-2022 period, in both value and volume. Exports increased considerably between 2007 and 2014, reaching the maximum value in this last year, at USD 196.6 million; this coincides with the price evolution (see also Graph 3.4). After this period, exports fell drastically until 2016; they then recovered until 2018, and continued to decrease after that. In 2022, quinoa sales abroad were valued at USD 46.5 million, which is 24% of the amount registered in 2014.

In terms of volume, the positive trend in exports accelerated since 2004, and did the same a few years earlier in terms of value. The maximum level was reached in 2013, at 34,700 mt, then falling until 2015, though this deceleration was much less acute compared to value. Between 2015 and 2020, volume of sales abroad recovered, reaching in this last year a level much higher than that of 2013 (37,300 mt), with a fall once again after this. In 2022, the volume was 22,300 mt, a rather low level, representing 60% of the 2020 value.

[9] It is estimated that 4% of gross production is consumed by the producers themselves.
[10] Contraband to Peru is attributable to the high demand for the grain, particularly for royal quinoa of the Southern Altiplano, as well as to the ease in selling products informally at Bolivia's borders. Bolivian quinoa is not only consumed in the neighboring country, but is also reexported as Peruvian.

Graph 3.8. Bolivian quinoa exports, 2000-2022



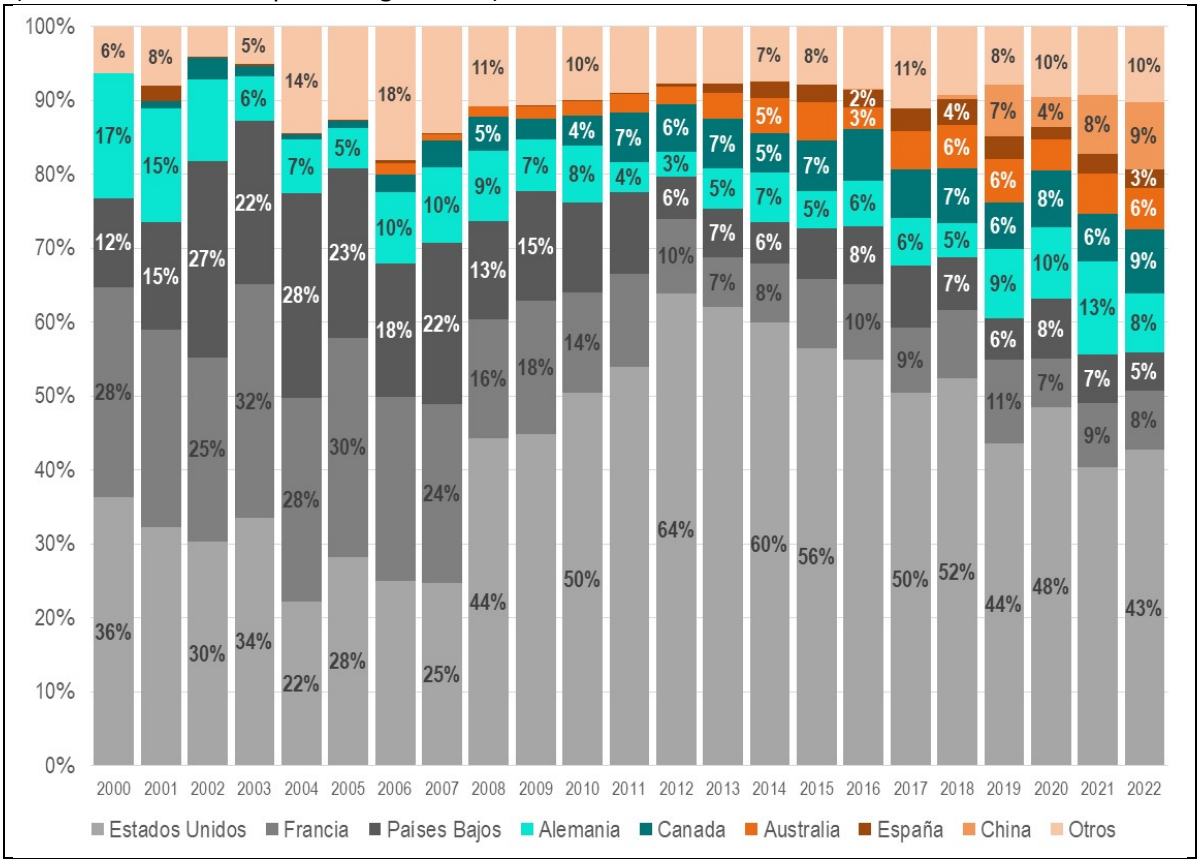
Source: Own preparation, based Instituto Nacional de Estadística (National Statistics Agency – INE) information

Graph 3.9 and Table 3.5 present Bolivian export volumes by main destination country. In 2020, 81% of exports went to three countries: the United States (36%), France (28%) and Germany (17%). From 2000 to 2007, exports to these economies increased, though at an annual average rate lower than to the Netherlands and the other countries (see Table 3.5). This explains why the percentage shares of the three main destinations fell to 59% in latter years.

Since 2007, the United States increased its consumption of Bolivian quinoa, in worth, reaching 64% of total production value in 2012. In the same period, Canada, Australia and Spain also became important, while exports to France, the Netherlands and Germany increased, but at low rates, which led to lower levels of participation: 10%, 6% and 3%, respectively, in 2012.

As of 2012, exports to the United States fell, reaching a participation rate of 43% in 2022. This fall is the factor that most explains the reduction of total export sales of Bolivian quinoa (see Graph 3.8). The consumption (in value) of France and the Netherlands also decelerated, but their participation conserved a relatively stable trend in later years, at approximately 9% and 7%, respectively. In contrast, Germany's percentage went up from 3% in 2012 to 7% in 2014, falling afterwards, but recovering in the last years.

Graph 3.9. Bolivian quinoa exports by main destination countries, 2000-2022
(In value – USD – and percentage shares)



Source: Own preparation, based Instituto Nacional de Estadística (National Statistics Agency – INE) information

Table 3.5. Growth of Bolivian quinoa exports by main destination countries, 2000-2022
(Average annual rates of values in USD)

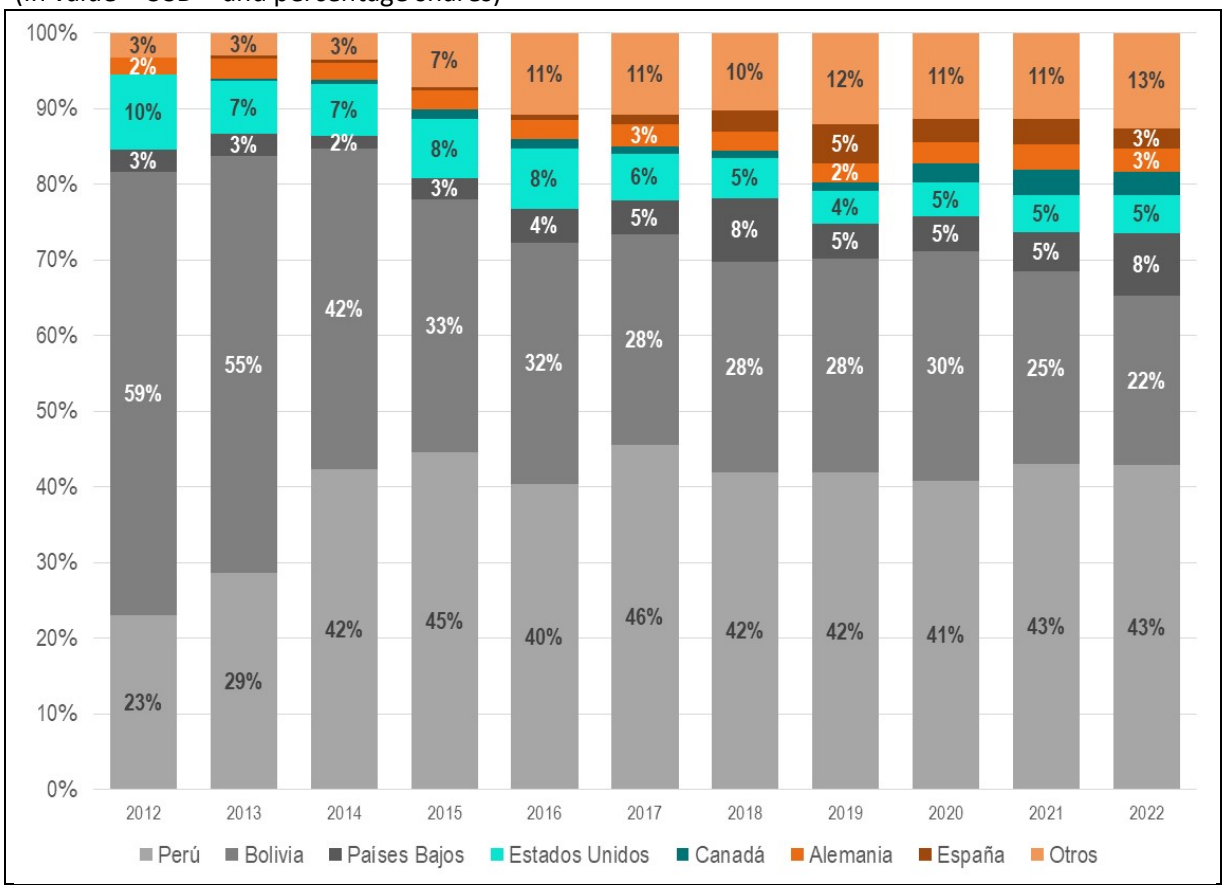
Country	2000-2007	2007-2014	2014-2017	2017-2020	2020-2022	2014-2022
USA	25.7%	67.1%	-31.7%	6,0%	-33.4%	-20.0%
France	29.7%	25.7%	-24.9%	-2.6%	-22.1%	-16.5%
The Netherlands	44.6%	21.2%	-17.5%	6.4%	-42.9%	-17.2%
Germany	23.6%	38.4%	-28.1%	22.7%	-35.6%	-14.5%
Canada		55.8%	-22.2%	13.3%	-24.9%	-11.2%
Australia		87.8%	-25.4%	0.1%	-18.4%	-14.8%
Spain		124.2%	-20.5%	-11.4%	-12.9%	-15.3%
China			-23.6%	354.1%	6.6%	62.0%
Others	49.3%	33.9%	-17.4%	2.4%	-26.6%	-13.1%
Totals	32.8%	48.8%	-27.6%	7.4%	-29.1%	-16.5%

Source: Own preparation, based Instituto Nacional de Estadística (National Statistics Agency – INE) information

Between 2014 and 2022, the negative price effect led to a fall in the values exported to all commercial partners, with the exception of China. This Asian country began to consume Bolivian quinoa in 2014, and has since then increased its imports at an average annual rate of 62%, coming to represent 9% of Bolivia's exports in 2022. It is important to mention that 83% of Bolivian quinoa exports are certified as organic, which leads to the need for conserving robust control over the organic production system so that Bolivia can continue to be competitive in the market in the long-term (Jacha Inti, 2024).

Lastly, Graph 3.10 presents the percentage shares in the value of exports at the world level for the period with this data available.

Graph 3.10. Quinoa exports at the world level, 2012-2022
(In value – USD – and percentage shares)



Source: Own preparation, based Instituto Nacional de Estadística (National Statistics Agency – INE) information

In 2012, 59% of global sales came from Bolivia, but this percentage decreased steadily to 22% in 2022. In the first years of the analysis, the country lost relative importance to Peru, which increased its share from 23% in 2012 to 42% in 2014, becoming the main exporter of the Andean grain, though it did not continue with a positive trend in later years. This change in the participation was

largely attributable to greater production of conventional quinoa in the neighboring country[11]. An increase in yield also had an effect on prices falling[12].

2014 saw considerable changes in the make-up of world exports, as the Netherlands, Canada, Germany, and other economies, among which France, Ecuador, Belgium, and Austria, increased their participation over time, which led to a reduction of the percentages of some countries. World exports also decreased in the 2014-2022 period because of the price effect already observed, but at a rate considerably lower than that of Bolivia's exports.

IV. Present situation and prospects of the quinoa value chain

This section was prepared largely based on primary information provided by eight stakeholders of the chain (producers, businesspersons and technicians). These persons were interviewed in December 2022 with the aim of knowing their perceptions on the present situation and potential of production and markets, including matters of sustainability, diversification, differentiation, and productive complementarity.

IV.1. Demand

As regards quinoa demand, in general those interviewed mentioned that Bolivian quinoa exports went through a difficult time in recent years, given the decrease in the country's participation at the international level, with scant prospects of reactivation. However, in a recent market report it was mentioned that there was an increase in 2023 in the prices of white organic quinoa from USD 2,000 per metric ton in January, to USD 3,200 in December, fostered by strong demand for organic quinoa, particularly in Europe, where Bolivian exports increased by 51% (Jacha Inti, 2024).

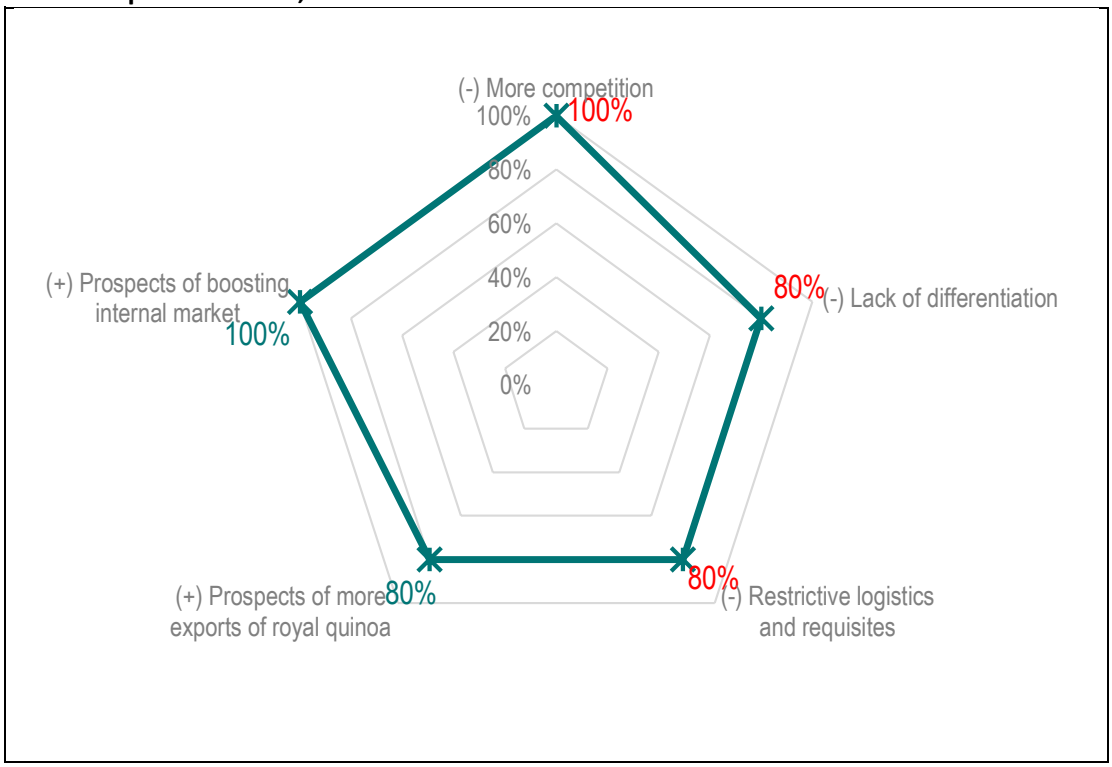
Firstly, the decrease in Bolivia's share in the international market was attributed to greater competition, "such as from Peru, as the main producer and seller of quinoa, and from Spain, that increased its production with more efficient technology for serving its own market and foreign ones." Under this scenario, Bolivia began losing its competitive and comparative advantages, added to which were low yield due to inefficient farming technologies, lack of agro-weather information for managing risks, and lack of adequate use of seeds, among others (see Graph 4.1).

When it occurred, the fall in sales abroad led to some companies having to interrupt or reduce their operations, while others struggled in markets that had no growth. Additionally, the problems of the pandemic and the war between Russia and the Ukraine also worsened the scenario for market reactivation.

[11] According to UIC (2020), at the end of the 2010 decade, Peru exported 60% of organic quinoa and 40% of conventional quinoa.

[12] Prices of organic quinoa, that has a higher percentage of production in Bolivia, are higher than those of conventional quinoa, but given that they are substitute products, there is a high price correlation between the two.

Graph 4.1 Opinions of those interviewed on the present situation and prospects of the Bolivian quinoa market, 2023



Source: Own preparation, based on interviews done

Secondly, 80% of those interviewed mentioned that the reduced participation of Bolivian quinoa in the international market is also attributable to lack of differentiation. Organic royal quinoa achieved a certain position in the international market through some exporters and importers, though "it was not enough" and "most foreign consumers do not seem to be well informed" on its virtues. What is more, some consider that this space that was won is diluting, as some large importers in the US and Europe prefer to buy other, cheaper types of quinoa, though the situation seems to have reverted to a certain degree, in terms of what was mentioned at the beginning of this section.

Thirdly, in a percentage similar to the previous one, those interviewed spoke of problems in terms of logistics, such as availability of transportation (containers, ships, etc.) and certain restrictive requisites, such as organic certification requiring two to three laboratory analyses.

Notwithstanding the above, some positive prospects emerged. Eighty percent of those interviewed consider that royal quinoa can keep its place in the international market through brand positioning at the geographic level or by designation of origin, and they add that quinoa can reach new markets, such as Middle Eastern countries. As regards the internal market, all interviewees consider that domestic consumption is increasing "since the existence of products such as bars, flour, extruded quinoa, "popcorn", pasta, and others." This occurs at the retail level in markets and supermarkets of the cities, and even at the level of the producers themselves. Also, "some

associations are suppliers of the municipal school breakfast, preparing bread and other products with quinoa." Still lacking however is a policy promoting internal demand for quinoa: "Presently, the State entities that buy quinoa, such as EBA and EMAPA, are paying the minimum price, which is not an incentive for producers, as it doesn't cover their costs."

Finally, it is worth noting that in the opinion of the interviewees, quinoa contraband to Peru is the sphere "always active", together with the sale of value added products in the domestic market.

IV.1.1 Differentiation of organic royal quinoa from the Southern Altiplano

As previously mentioned, organic royal quinoa, produced in the Southern Altiplano, has positive growth prospects. This is attributable to its better quality in terms of nutrition, flavor, size, and shape (shiny, white). In this sphere, those interviewed were asked about the possibility of progressing in differentiating this product in the international market, and all of them stated that such promotion is necessary.

A first way of progressing along these lines is the so-called *designation of origin* of royal quinoa. Presently there is a steering committee for promoting it, that is realizing procedures for the international recognition of royal quinoa, and there has been progress in terms of compliance with the requisites at the domestic level in the sphere of the National Intellectual Property Service (SENAPI). However, some interviewees mentioned that the stakeholders in the chain do not share a common line for this differentiation, given that for example, the exporting companies are promoting the implementation of a geographic indicator[13] or country brand[14] for positioning royal quinoa from the Southern Altiplano of Bolivia.

It is worth noting that implementing the designation of origin presents several challenges, such as the need to unify territories and actors (in a broad and inclusive manner), differentiation of roles (executive and overseeing), making the administration of the income generated by the brand transparent (given the various interests that generate mistrust among stakeholders), and paying the associated costs.

On the other hand, some of those interviewed argue that differentiation should concentrate on market niches that value organic food. A first segment, the one of highest quality, would be established for organic quinoa under fair trade; and a second segment could concentrate on a broader market, with less certifications and requisites than the first[15].

The first segment mentioned could be the most adequate one for differentiation through the designation of origin. Also relevant could be a brand positioning in terms of quality, accompanied by messages such as the historical context of quinoa production at the small scale, cultivated by

[13] The private sector grouped together under CABOLQUI has made progress on these indicators.
[14] The country brand may also be associated with regenerative agriculture, which is tied to soil health, crop rotation, nutritional density, and carbon sequestration, among others. One of those interviewed mentioned that the *Andean Valley* company, the PROINPA foundation and some communities have been working to achieve regenerative organic certification, which also aims at better price prospects.
[15] Conventional quinoa production would be in a third, more mass consumption sector, competing with quinoa produced in the rest of the world.

indigenous families, and the cultivation zone, which is highly valued for its natural beauty – consider for example the Uyuni Salt Flats. This requires "progressing in studies that demonstrate the virtues mentioned and for [the stakeholders] to effectively communicate abroad, in plain language." Within this context, it is also possible to conciliate with labor practices that advance under the standards of fair trade, as well as gender equality and socio-labor protection, which are in the sphere of due diligence.

IV.1.2 Production diversification

Production diversification implies quinoa transformation into various products with value added. This aspect was delved into in the interviews because of the prospects related to increasing the demand for the Andean grain.

In this regard, all of those interviewed mentioned that greater production diversification is essential, "more so after the pandemic, which showed the need for consuming superfoods." Mention was made also of the relevance of preserving organic quality, besides improving agricultural yield and technology. Some of those interviewed consider that effective progress in transformation of the grain is a legitimate aspiration of the producer families within an associative community model.

According to those interviewed, production diversification of royal quinoa in Bolivia has had considerable progress. Furthermore, it has good prospects from the perspective of consumers at the national and international levels, as there is presently a shift towards consuming less meat, with more consumption of more healthy flour – *e.g.*, gluten free – and this may be taken advantage of. In this regard, quinoa flour can see considerable growth, though for specific market niches, as its more natural characteristics and its smaller scale of production pose limits to taking on a broader market. Given all of this, it is worth noting that quinoa is more expensive than other alternatives, and is therefore often mixed with other grains, though it is necessary for achieving greater consistency of dough.

"Production diversification is progressing, particularly in the domestic market, but it's possible to serve international markets such as Sweden, Denmark, Finland, and some Asian or Middle Eastern countries. For this, research on the preferences of these consumers would be needed." Given the high level of competition at the world level, with large companies selling derivative products comparable to quinoa – *e.g.*, energy bars, flakes, breakfast cereals – one option would be to establish strategic alliances with them.

Among the additional options of value added products to be considered, some of those interviewed proposed advancing in the preparation of products combined with cañahua, amaranth, cacao, Brazil nuts, and coffee. Besides this, the proposal was made of working with industrial dairy plants for developing vegetable milk made of quinoa and tarwi, with the latter as a nitrogen fixer.

IV.2. Productive complementarity

Productive complementarity entails possibilities of working in a joint and coordinated manner with stakeholders of interest; however, one of the weaknesses of the Bolivian quinoa value chain is the dispersion of the efforts of both public and private stakeholders. In this regard, it is necessary for the State to promote strategic alliances between actors, with clearer roles. Besides this, those interviewed mentioned that the private sector has been giving positive signals for working with producers under a "win-win" criterion in captive markets.

Universities also constitute potential strategic allies. Specifically, the public universities have trained human resources, though they lack funding to pay for applied research work and patents.

Lastly, participation in global value chains also stands out as an idea among the interviewees, given that there are options for working in supply chains. For example, one proposal was to produce and bottle Bolivian quinoa drinks, with chocolate or other flavors, outsourcing with an industrial plant abroad to produce these drinks at a location closer to the countries where there is demand.

IV.3. Prices

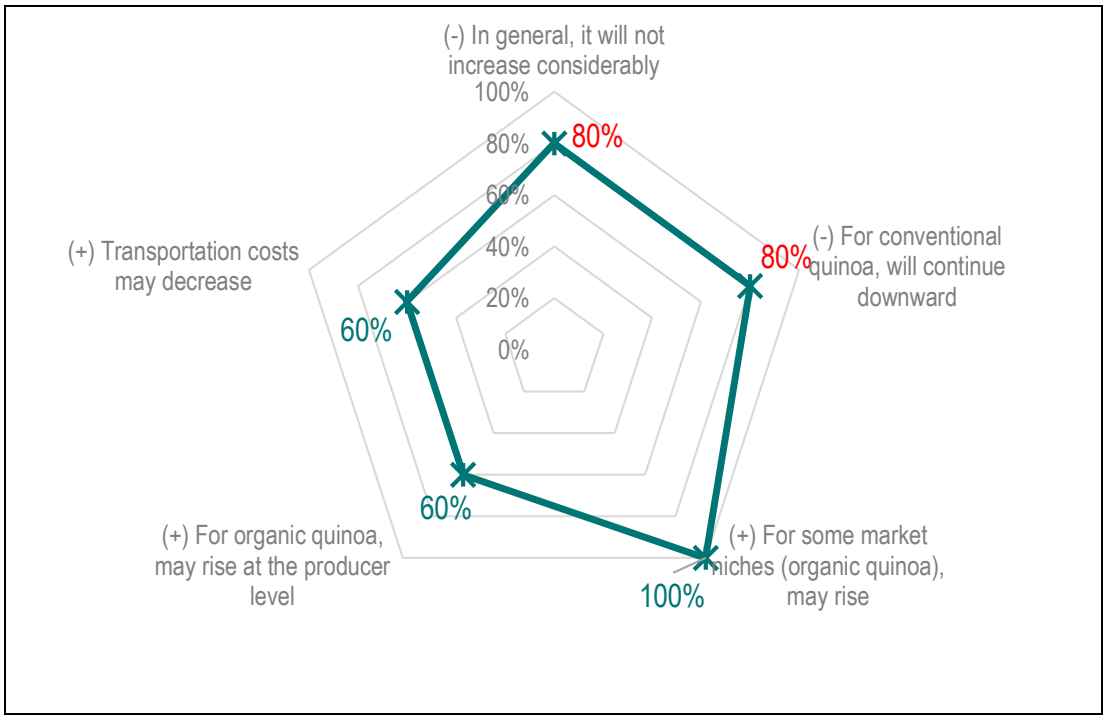
All interviewees discarded the possibility of a considerable price increase. Expectations, on the contrary, were for prices to remain stable in the short-term, and even for them to fall in the medium- and long-term. The perception is that this would occur because of a preference for consuming domestic quinoa in the developed countries, such as the United States and Europe, where production is increasing because "it is cheaper, and people have become indifferent to quality or grain size[16]." Besides this, the fact that other countries, like Spain and China, are increasing their production, will have an effect on the price fall of Bolivian quinoa "if differentiation is not promoted" (see Graph 4.2). However, as mentioned in Section IV.1 Demand, in 2023 there was a price increase of white organic quinoa from USD 2,000 per metric ton in January to USD 3,200 in December; that is, an increase of 60%, attributable to contamination by phosphonic acid in Peruvian quinoa, and also because of high demand for organic quinoa, particularly in Europe, where Bolivian exports increased by 51% (Jacha Inti, 2024).

Also, 80% of those interviewed considered that the price of conventional quinoa will continue to decrease. "Presently there are Brazilian producers that offer quinoa at USD 1,400 per mt, with a capacity of 500 mt per year, and the product is acceptable." This being said, in some market niches, such as the one for fair trade organic quinoa, prices may rise because of the differentiating qualities. "Organic quinoa is selling at between USD 1,800 and USD 2,000 per ton"; "It is likely that the price will rise this year due to low supply levels in Bolivia and Peru" and for it to then reach levels of between USD 2,000 and USD 2,200 per ton, though as mentioned in the previous paragraph, there was already a price increase at the end of 2023.

[16] Given this, some interviewees consider that the price fall may be a disincentive for producing in countries such as Spain, Canada and the United States. For the first two countries, the perception is that producers prefer producing more profitable grains. In the US high production costs have been observed.

Additionally, 60% of those interviewed consider it possible for organic quinoa producer prices to improve[17], and for transportation costs to go down, which could help to compensate income and improve profit possibilities.

Graph 4.2. Expectations of interviewees on Bolivian quinoa prices and income, 2023



Source: Own preparation, based on the interviews done

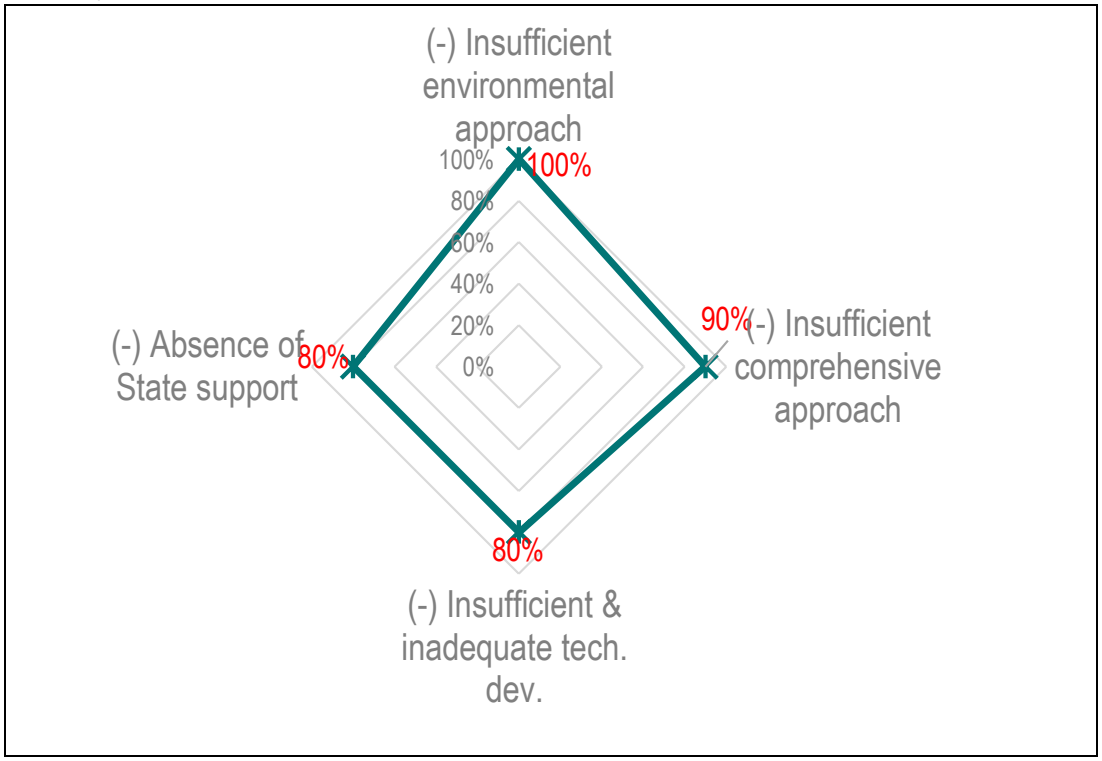
IV.4. Sustainability of the production of quinoa and its derivatives

The sustainability of quinoa production is presently a key aspect (see Graph 4.3). Those interviewed argue that the matter of the environment is one of the most sensitive elements of the production chain. This is also related to the considerable increase in the cultivated area through the use of less fertile land. This practice, as mentioned, implied a reduction of other native species which acted as live barriers, causing soil erosion.

Some studies consider that the critical problem of quinoa cultivation is the availability of water, particularly during sowing. The delay in the rainy season is a crucial factor, as lack of water during sowing causes a loss of up to 90% of yield. For this reason, the implementation of deficit irrigation systems is justified, for improving crop productivity in arid zones (Saavedra and García, no date).

[17] Some of those interviewed considered that in 2023 quinoa production could reach only 50% of 2022 production due to climate factors. This phenomenon, together with the issue of contamination of Peruvian quinoa, led to a progressive increase of prices at the producer level in 2023.

Graph 4.3. Opinions of interviewees on the sustainability of quinoa and its derivatives in Bolivia, 2023



Source: Own preparation, based on the interviews done

The interviewees stated that attention paid to the environment is insufficient. "Until a few decades ago, quinoa was cultivated respecting the fallow period of the soil, and a production ecosystem was preserved combining these crops with llama raising. The quinoa production and export boom, particularly during the years influenced by the International Year of Quinoa (2013) generated practices that are unfriendly towards the production ecosystems of the territories, which were very fragile to begin with and have to be managed carefully."

Some associations and companies have made progress in implementing sustainability strategies in royal quinoa organic production, recovering ecosystems and regenerative agriculture. These actions allowed increasing yield[18]. In this regard, Silva *et al.* (2022) state that despite the efforts made by producers and companies for investing in soil recovery in terms of managing native species and improved fallow periods, there remain several challenges for making the agricultural practices sustainable[19]. In general, these challenges are associated with the implementation of best agricultural practices allowing mitigation and adaptation to climate change. It is therefore

[18] A pilot experience in soil improvement on Jacha Inti S.A.'s land allowed an increase in yield of 50%.

[19] In line with what was mentioned, the producers are also aware of the importance of realizing actions for improving yield, and they value the importance of prioritizing soil improvement and comprehensive pest management, including a combination of the two.

necessary to recover the health of soils, promote crop rotation and restore live barriers, among other practices.

Additionally, and also related to the environment, lacking is a comprehensive approach to ensure both production sustainability and more carbon sequestration. It is also necessary to seek higher nutritional value of the quinoa produced, and to work on demand that is conscientious as to sustainability, at the national and world levels.

In this regard, organic quinoa of the Southern Altiplano stands out with good prospects. Also, the market niche approach, as opposed to mass production – associated with small-scale production, given the division of the land by plots in the zone – may foster regeneration of biodiversity. Some entities, such as Promoción e Investigación de Productos Andinos (Promotion and Research of Andean Products – PROINPA) are working towards this by implementing agricultural practices suited to international organic certification. An example of this is the development of organic products for pest and disease control in organic quinoa[20].

Another problem is economic sustainability. Those interviewed questioned the adequacy of use of technologies in the production chain that cannot be used at a commercial scale. "Producers have sought to adapt mechanized technology to the crops, but it should be the other way around: to adapt the crops to the technology. The production process has to change to adapt to mechanized technology." An example is mechanical harvesters, which could decrease production costs by 30% to 40%. Threshing machines could also be used to generate savings in the grain cleaning process.

Lastly, the interviewees mentioned that in the face of making the production of quinoa and its derivatives sustainable, the State has been practically absent, particularly in terms of development and innovation in technology.

v. Quinoa transformation beginning with the producers

Lastly, a questionnaire was done titled *Progress towards entrepreneurial initiatives of quinoa transformation*, in January 2023. Eleven producers belonging to Red Quinua participated in the questionnaire; they are CLAC members. The producers gave information on their experiences, what motivates them, their environment, and skills for developing business initiatives. The producers were mostly from the Municipality of Salinas de Garci Mendoza, having an average age of 44.7 years (between 23 and 65). Fifty-five percent of them have a university degree, 27% are middle-level technicians and 64% are men.

All producers stated that they are motivated towards developing business ideas or undertakings to add value to quinoa, though most of them do not have a concrete initiative idea; *e.g.*, producing quinoa beer. Besides this, only 27% of participants mentioned presently participating in a business, while 18% of them had prior experience on the topic.

[20] It is also worth noting that PROINPA aims to develop a Regenerative Agriculture Center in the Southern Altiplano for multiplying native species through implementing high technology greenhouses, preparing compost from waste generated in the intermediate cities, and producing biofertilizers.

In this context, questions were asked on environment factors that hinder developing a business or undertaking (see Table 5.1). According to the answers, all quinoa producers consider that the factor that hinders them "totally or largely" is lack of support services (technical assistance and training). Ninety-one percent also underscored lack of capital, financing and access to technology. In contrast, lack of access to raw material as inputs is considered a less important limiting factor.

Table 5.1. Limiting factors for developing a business or undertaking

Factors	Totally or largely	Halfway	Very little or not at all	Total
Lack of access to technology	91%	9%	0%	100%
Lack of capital or financing	91%	9%	0%	100%
Lack of access to raw material or inputs	55%	27%	18%	100%
Lack of access to markets	73%	18%	9%	100%
Deficient infrastructure (transportation, telecommunications, etc.)	82%	0%	18%	100%
Lack of support services (technical assistance and training)	100%	0%	0%	100%

Source: Own preparation, based on the questionnaire *Progress towards entrepreneurial initiatives of quinoa transformation*, 2023

The next step was to delve into the skills the producers possess to carry out their businesses. In this regard, the survey initially asked the if they had a resource considered important for performing their business. Only 36% of producers answered affirmatively, mentioning courses in accounting, sales, trade, exporting, and leadership.

Table 5.2 presents the detailed answers on the technical/administrative skills that the producers declared having for performing their business or undertaking. Most of those interviewed stated having "very little or none" of the skills. The highest percentage corresponds to lack of knowledge of tax matters (55%), followed by merchandising, marketing and sales, and financial education (45%). In contrast, 45% of producers consider that they possess skills "wholly or largely" in IT tools and in legal procedures for formalizing a business. And, few have skills in handling processing and transformation technology, which are essential for adding value to quinoa.

Table 5.2. Possession of technical/administrative skills for developing a business or undertaking

Factors	Totally or largely	Halfway	Very little or not at all	Total
Processing or transformation technology	18%	45%	36%	100%
Business plans	27%	27%	45%	100%
Accounting and costs	27%	45%	27%	100%
Tax matters	27%	18%	55%	100%
Merchandising, marketing and sales	36%	18%	45%	100%
Financial education (access to credit)	27%	27%	45%	100%
IT tools (Word, Excel, internet, email, etc.)	45%	27%	27%	100%

Legal procedures for formalizing a business	45%	18%	36%	100%

Source: Own preparation, based on the questionnaire *Progress towards entrepreneurial initiatives of quinoa transformation*, 2023

As to soft skills, Table 5.3 shows, in a general manner, the highest percentages in relation to the above skills. Seventy-three percent of those interviewed stated that they possess leadership skills "wholly or largely"; 64% have planning and time management skills, as well as communication and listening skills. In contrast, only 36% know how to network.

Table 5.3. Possession of soft skills for developing a business or undertaking

Factors	Totally or largely	Halfway	Very little or not at all	Total
Leadership	73%	18%	9%	100%
Planning, and managing time well	64%	18%	18%	100%
Negotiation skills	55%	27%	18%	100%
Networking	36%	27%	36%	100%
Creativity	55%	27%	18%	100%
Communicating and listening	64%	36%	0%	100%

Source: Own preparation, based on the questionnaire *Progress towards entrepreneurial initiatives of quinoa transformation*, 2023

Finally, the survey delved into the relevance of the actors for creating alliances allowing to develop a business or undertaking. The most favorable answers came from private companies (64%), followed by public entities or companies (55%) and universities (55%).

VI. Conclusions y recommendations

Quinoa production in Bolivia has concentrated in the Southern Altiplano, particularly in Oruro, with the Municipality of Salinas de Garci Mendoza standing out, but also in Potosí, where Uyuni leads. La Paz follows the previous two departments in importance, but its relative share is decreasing in time. In all other departments, production has been marginal, though quinoa cultivation has begun in the tropical region of the country, in Santa Cruz.

Between 1970 and 2022, quinoa production increased considerably, going from 12,200 has. to 123,600 has, and from 9.7 mt to 44.7 mt. The cultivated area saw a significant increase since 2008, reaching its maximum value in 2013, at 147,300 has. Production volume accompanied this dynamic, with the peak occurring in 2015 (75.4 mt). Additionally, the grain's yield was volatile throughout the period, and has a downward trend, attributable to a notable increase in the area cultivated in less fertile land, to the dwindling of other native species that acted as live barriers (resulting in soil erosion), and scarcity of manure for producing fertilizer. All of these factors also deteriorated the environment, which is essential for proper phenological development of crops.

The rebound of the crop, around the 2013-2015 period, was prompted by a substantial increase in international prices, resulting from greater demand at the global level. Despite this, in the following

years, prices fell, generating a strong reduction in the value of exports, with a lesser fall in terms of quantity.

As to demand, the main destination is for export, and the largest buyer of Bolivian quinoa is the United States. But the participation of this country is bell-shaped. The US bought 36% of Bolivia's exports in 2000, reached its peak in 2014 with 64%, and then fell to 43% in 2022. France, Germany and the Netherlands were notable participants in the 2000 decade, but then France and the Netherlands lost importance, with Germany following their trend, but the latter then rebounded in later years. In the 2010 decade, new countries acquired prominence, among them Canada, Australia and Spain. In the 2020 decade, these countries were important, together with China, whose share in 2022 surpassed that of any European country.

In terms of supply, Bolivia was the largest quinoa exporter until 2013, with a share of 55%, then losing supremacy to Peru. This change in participation is largely attributable to more production of conventional quinoa in the neighboring country, which together with its higher yield, also had an effect on the fall in prices of the organic Bolivian grain.

All in all, the dynamics of this crop in the last decades led to the development of the value chain. It began with milling, and then led to transformation of the grain into a series of foods such as flour, pasta, cookies, bread, flakes, energy bars, "popcorn", candies, flan, and others. Despite this, the productive development was not sufficient, and in recent years Bolivia lost its comparative and competitive advantages. This situation was aggravated by the COVID-19 pandemic and the Russia-Ukraine war. Added to this were logistical issues, such as the availability of transportation (containers, ships, etc.), and more restrictive requisites, such as organic certification.

Also, the interviewees mentioned lack of differentiation of organic royal quinoa at the international level is attributable to lack of information, and to the fact that few market niches value organic foods. Presently there is a Designation of Origin Steering Committee that is carrying out actions for making progress in this differentiation. However, it seems the actors of the chain do not have a common line, given that the exporting companies are instead promoting the implementation of a geographic indicator or country brand.

As to the stakeholders in the chain, it is worth noting that the quinoa producers are the ones in the most vulnerable position. On the one hand, following the boom of quinoa sales due to high prices, profit margins fell; in 2022, 72% of those interviewed stated that their margins were 10% or less on the production value. Producer prices were considerably lower than those of wholesalers. Also, lower yield had a direct effect on lower profitability of the factors of production employed (*i.e.*, land, capital and labor). This situation turned around somewhat in 2023, with progressive increases in producer-level prices owing to an increase in the demand for and the prices of Bolivian quinoa exports.

One alternative to this scenario would be to promote greater diversification of production based on initiatives for developing products with value added, considering the participation of quinoa producers. In regards to this, a questionnaire done with 11 producers revealed their interest in developing business ideas or undertakings. However, most producers need to strengthen their

skills, particularly their technical/administrative skills, such as in processing or transformation technology, preparing business plans, accounting and costs, tax matters, merchandising, marketing, and also sales and financial education. The business environment is not favorable either; the most hindering factors are lack of access to technology, to capital and to financing.

In this complex scenario for the sector, the interviewees argue that Bolivian quinoa, specifically royal quinoa, has the potential to remain in the market thanks to its differentiating characteristics, by means of positioning a geographic brand or a designation of origin. Besides, there are new international markets such as the countries of Eastern Asia and the Middle East.

The internal market can also expand with the consumption of products with greater value added in supermarkets, specialized stores, and government purchases, though policies and measures promoting this market are still needed.

Given what was mentioned, it would be adequate to make use of the findings in the form of policy recommendations:

- Progressing in **differentiation** of royal quinoa from the Southern Altiplano, for its flavor, size, color, etc., with organic or regenerative agriculture, to promote more consumption in certain market niches at the world level that value these qualities. This would imply designation of origin, geographic indicator, country brand, and other instruments from a perspective of effectiveness; that is, efficacy (viability) and efficiency (same result at a lower cost). Among other instruments, it is worth noting that the Southern Altiplano of Bolivia is also renown at the world level for the Uyuni Salt Flats, and the production there is at the small scale, rooted in the community life of the zone.

- Promoting **more productive transformation of quinoa**, maintaining the organic quality and improving the technological basis. This dynamic should be accompanied by new external and internal market niches, which would imply doing research on consumer preferences, as well as competition.

  Development of products with value added constitutes a legitimate aspiration of many quinoa producers. Under this context, it would be adequate to strengthen their skills and support them to promote their business ideas with mechanisms such as “business incubators”.

- Greater productive transformation of quinoa could also be associated with **more diversification**. Quinoa products could be prepared in combination with cañahua, amaranth, cacao, Brazil nuts, and coffee. Vegetable milk production made of quinoa and tarwi is another option, as well as beer made from quinoa.

- **Productive complementarity** is also important. It is necessary to seek collaborative and associative work with the different actors of the production chain, avoiding the dispersion of efforts, both public and private, and fostering strategic alliances.

- **Sustainability of quinoa production** requires a comprehensive approach including best agricultural practices to recover the soil's health. Also important is care for the environment with mitigation measures for climate change, and irrigation systems aimed at satisfying water needs, as well as fostering consumption of quinoa that is conscientious, including its manner of production. The initiatives of implementing actions in the sphere of regenerative organic certified (ROC) have shown to be promising for dealing with this matter.
- Finally, in the **industry sphere**, it is necessary to consider implementing stricter controls at the field level to ensure provision of raw material free of pesticides, as well as maintaining security stocks or planning deliveries in the long-term for mitigating risks related to scarcity of foreign currency that may have a negative effect on exports.

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