

The Sustainability of the Cultivation of Quinoa in Peru-Approximations After the International Year of the Quinoa (AIQ)



Rember Pinedo Taco* and Luz Gómez Pando

Departamento de Fitotecnia, Facultad de Agronomía, Universidad Nacional Agraria La Molina, Lima, Perú

Submission: June 28, 2019; **Published:** July 22, 2019

***Corresponding author:** Rember Pinedo Taco, Departamento de Fitotecnia, Facultad de Agronomía, Universidad Nacional Agraria La Molina, Lima, Perú

Keywords: Family agriculture, genetic resources, comparative and competitive advantages, sustainability

Introduction

Thanks to the enormous publicity and diffusion of the AIQ, carried out at global level led by the governments of Peru, Bolivia, Ecuador, Argentina and France (Group of countries of the International Committee of the AIQ), the world has known quinoa, as a food of high nutritional value and with nutritional and medicinal properties that could contribute to improve food security in developing countries, promoting its cultivation that is highly adaptable to most of the climatic conditions of the orb. This generated a high demand for the product and, consequently, increased the prices of quinoa, generating temporary profits for the producers.

The question is, what is the situation of producers of family farming systems? After a stage of economic prosperity, after the AIQ, they have returned to the reality of a policy that protects neither prices nor genetic resources. Currently more than 70 countries are in the experimental phase and others have already started large-scale production. The losers will be the small producers who produce in conditions of high climatic, financial adversity and state lack of protection. The countries of South America and specifically Peru, must now face the global competition of highly technician and industrialized countries that easily based on improvements and even genetic manipulation of quinoa can exceed the average productivity of the original countries.

The consequences can be irreversible due to the uncontrolled exit of genetic material. In Peru, the lack of national policies for the protection of genetic resources is evident; For example, Puno,

which is the largest quinoa producing area in the country to date, could not achieve the denomination of origin, or Plant Breeders' Certificates (COV). On the other hand, the high genetic instability of quinoa can be a negative factor; commercial varieties registered in Peru, when they leave to another country for multiplication purposes, can be adapted by very easily changing their phenotypic characteristics and could be registered and patented as a new variety.

Despite having some natural advantages and comparative advantages, in general production is stationary, with low quality and lack of standardization of the product, individualized and small sale, limited access to markets and lack of community rural industries. However, one of the causes of the limited development of the local industry is the reduced local market, both for the grain (low levels of consumption per capita) and for the products derived and little demanding with quality and innovation. There is weak pressure from local consumers towards the supply of more and better products from the food industry, which use quinoa as an input. That is one of the causes of the limited development of that industry. Therefore, it will be essential to generate competitive advantages through forms of association, production and marketing that enable the development of differentiation factors based on research, innovation and the development of products in which quinoa is paramount for its multiple benefits. Meanwhile, the role of the State is relevant in terms of support and generation of a regulatory framework and with the promotion of public policies for the productive sector of quinoa.

The objective of this article is to analyze the impacts generated in family farming systems of highland areas of Peru in terms of technological innovations, management and conservation of resources: soil, water, genetic resources and an approach to the sustainability of production of quinoa, after AIQ 2013.

National Production and Regional Performance of Quinoa Production

According to official MINAGRI figures (2014), the quinoa production of 2014 was 114,000 tons, a figure that reflects a growth of 119% compared to 2013 that reached 52,000 tons. This increase was mainly in the regions of Arequipa (522%), Puno (23%) and Junín (173%), based on the largest sowings executed and, consequently, the highest yields obtained.

At the regional level, on the coast in the departments of Lambayeque, La Libertad, Ica, Tacna and Lima, the growth rate of quinoa production was 24% per year, while in the departments of the southern highlands (Arequipa, Apurímac, Ayacucho, Cusco, Moquegua and Tacna) was 18.7% annual average. In the case of Puno, it grew at a slower pace, and its participation in national production decreases each year [1].

Case of the Expansion of Quinoa Cultivation in Ayacucho

Agriculture practiced in the high-Andean tropical zones (> 2500 masl) is based on the management of biodiversity and different farming systems in a wide range of socio-economic and environmental scenarios that allow the self-sustainability of small and medium farmers in rural communities (Fonte and Vanek, 2010). The production area of quinoa in Ayacucho according to Gómez and Aguilar (2014) and Tapia et al. (2014) corresponds to the inter-Andean valley agro-ecological zone. The production of quinoa is practiced from 2500 to 3800 masl [2]. At the level of the Ayacucho region in the 1992/93 season the cultivated area was 123 ha, in 2003/04 2140 ha, increasing to 5768 ha in the 2012/2013 season. At the provincial level, the growth of the cultivated area in Huamanga stood out, from 244 to 2536 hectares, which represents an increase of 939% in the last 10 agricultural seasons [3]. According to the [4] in the 2014/15 campaign in Ayacucho the total area planted reached 11 115 hectares, of which 6429 have been planted in the province of Huamanga. Currently, quinoa is planted as monoculture, with a predominance of conventional production systems that involve the intensive use of soils, intensification of agricultural mechanization, indiscriminate use of synthetic fertilizers and pesticides, use of improved varieties with predominance of white quinoa displacing the color quinoa and the local ecotypes, and the reduction of areas of other traditional food crops [5].

Main Markets and Customers

The commercialization of the quinoa grain has three types of market: internal regional market (district and provincial fairs and in the departmental capital); external regional market (production goes outside the departmental scope to supply

the demand of the national market); and finally export market to the different countries that demand quinoa [1]. Peruvian quinoa is exported to the international market as conventional and organic, being for the last five years (2010-2014) 75.4% of conventional type, with an annual growth rate of 67%. The annual growth rate of organic quinoa was 82%. In 2014, it was possible to export 27,200 tons of conventional quinoa and 8,900 tons of organic quinoa (The United States is the largest importer of Peruvian quinoa, with a tariff of 0% established for the entry of quinoa via the TLC).

However, despite the preferences of the international market for healthy products, the preference for organic quinoa has not been as decisive, since in practice more conventional quinoa was exported. This is another valid argument to analyze the possibility of massive production of quinoa in other countries with higher technology support (protection measures and subsidies and financing) which could easily displace domestic production. Perhaps it should be considered as a more favorable possibility (less possibilities of direct competition in the production of quinoa due to its unfavorable agro-ecological characteristics for the production of quinoa, but, comparative advantages due to the technological level reached in the food industry) trade with countries like Brazil that also through the application of the Agreement of Economic Complementation, exports have a 0% tariff like Uruguay and Paraguay. Likewise, South Africa with which Peru is in the process of negotiating an TLC; also, Asian and Oceanian markets who demand and prefer natural products.

Annual Per Capita Consumption of Quinoa

Despite the immense campaign of diffusion made in favor of the consumption of the quinoa this has not had significant increases, according to general data provided by the MINAGRI in 2012 the annual per capita consumption was 1.20 kg / person / year. According to IICA [1] in a study carried out by ADEX (2001), it is estimated that per capita consumption at the national level is 0.52 kg / year, with the urban population registering a relatively low consumption (according to the results of IV CENAGRO, the main destination of the national production of quinoa per planting But, according to the FAO-ALADI [6], the consumption of quinoa estimated for 2012 in kg / person / year in Peru was 1.15 kg. area would be for self-consumption 68% of the total, 31% is destined for sale, and 1% for seed).

According to studies carried out by IICA [1] in the regional area of Puno and Junín, annual per capita consumption of 3 kg / person / year; while Junín would reach 3.6 Kg at an urban level and 15 Kg / person / year at rural level, which would merit reviewing the aforementioned figures since they are quite far from the national average provided by MINAGRI, with the aforementioned averages at the Puno level and Junín would be consuming an average of 9 kg / person / year. But if confirmed these figures can be an excellent indicator of the increase of family consumption of quinoa at rural and urban level with a clear tendency to improve food and nutrition security [7].

Loss of Biodiversity and Global Competition for Quinoa Production

After the IQY, more than 70 countries have quinoa genetic material from Peru and Bolivia, which are the two main countries of quinoa. In countries like USA, France, Holland, England with economic and technological support of their governments are in the research phase and several countries in the production phase [8].

Under these conditions, will farmers mainly have family farming systems, possibilities to compete with high technology and large industry in developed countries? Despite the natural and comparative advantages of having a huge variability of quinoa genes and as demonstrated, they can be adapted to almost all life zones existing in Peru; however, under current conditions, the producers of the altiplano and the inter-Andean valleys will have little chance of competing with the quinoa product and its derivatives if the developed countries begin the production of quinoa on a large scale. Production at the coastal level and marine Yunga would have better possibilities; However, the limiting factor that has not yet been solved is the phytosanitary issue (high incidence of pests obliges the indiscriminate use of pesticides). The average yield reached in the country is 1.2 t / ha, considering that some varieties have a productive potential of 9 t / ha, highly technician countries with protectionist agricultural policies can reach these roofs via genetic improvement and export quinoa with high added value and on a large scale. Possibly it will not be news that in a few years the original countries are forced to import quinoa [9,10].

Conclusion

The expansion of the demand for quinoa and its agro-industrial derivatives in higher income countries is associated with more general trends of changes in consumption patterns, which increasingly favor foods that have healthy nutritional characteristics, offer health and safety guarantees and are associated with some special characteristics, such as the condition of being organic products. The main risk that threatens the growth of exports is the possible entry into production of countries with developed technology such as the United States of America, European countries and others whose agroclimatic conditions are favorable.

It will be key to enhance the natural advantages and comparative advantages of quinoa production by efficiently taking advantage of international market opportunities, with high quality standardization of the product. Likewise,

the generation of competitive advantages through forms of association, production and commercialization that make viable the development of differentiation factors based on research, innovation and the development of products in which quinoa is paramount for its multiple benefits. Procure the differentiation that implies collective marks associated with knowledge and ancestral management of quinoa cultivation in the high Andean areas of the country.

The production of conventional quinoa on the coast intensified, including with government support (Crop Reconversion Program), with the idea of increasing export volumes and increasing local consumption; however, shipments of the product were returned for exceeding the maximum residue limits (MRLs) of pesticides. There is a high risk of loss of market share derived from these rejections, which affect the prestige of the Peruvian product.

Acknowledgement

Project for the Development of Value Chains for the Conservation of Biodiversity and the Improvement of Rural Livelihoods. SP Native Grains. VLIR-UNALM

References

1. Instituto Interamericano de Cooperación para la Agricultura (IICA) (2015) El mercado y la producción de quinua en el Perú, Lima, Perú.
2. Pinedo R, Gómez L, Julca O (2017) Caracterización de sistemas de producción de quinua (*Chenopodium quinoa* Willd) en el distrito de Chiara, Ayacucho. *Aporte Santiaguino* 10(2): 351-364.
3. Dirección Regional Agraria Ayacucho (DRAA) (2014) Dirección de Información Agraria y Estudios Económicos, Peru.
4. Dirección Regional Agraria Ayacucho (DRAA) (2015) Dirección de Información Agraria y Estudios Económicos, Peru.
5. Pinedo R, Gómez L, Julca O (2018) Sostenibilidad de sistemas de producción de quinua (*Chenopodium quinoa* Willd). *Ecosistemas y Recursos Agropecuarios* 5(15): 399-409.
6. FAO - ALADI (2014) Tendencias y perspectivas del comercio internacional de quinua documento conjunto. Santiago de Chile, Chile.
7. Fonte S, Vanek S (2010) Explorando Opciones Agroecológicas para el Manejo de la Fertilidad del Suelo en Sistemas de Agricultura en pequeña escala de las Zonas Altoandinas, (CIAT) Cali, Colombia.
8. Gómez L, Aguilar E (2014) Guía del cultivo de quinua. Programa de Investigación y Proyección Social de Cereales y Granos Nativos Facultad de Agronomía Universidad Nacional Agraria La Molina, Lima, Perú.
9. Ministerio de Agricultura y Riego (MINAGRI) (2014) Dirección General de Seguimiento y Evacuación de Políticas - Dirección de Estadística Agraria, Agraria.
10. Tapia M, Canahua A, Ignacio S (2014) Razas de Quinua del Perú. ANPE, Perú y CONCYTEC, Lima, Perú.



This work is licensed under Creative Commons Attribution 4.0 License

**Your next submission with Juniper Publishers
will reach you the below assets**

- Quality Editorial service
- Swift Peer Review
- Reprints availability
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats
(Pdf, E-pub, Full Text, Audio)
- Unceasing customer service

Track the below URL for one-step submission
<https://juniperpublishers.com/online-submission.php>