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PRODUCERS OF QUINUA IN LAKE TITICACA. CASE: CAMPESINA DE CARABUCO COMMUNITY SEEN FROM THE GENDER APPROACH

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Abstract: The objective of the research was to describe the uses and perceptions of quinoa (Chenopodium quinoa), differentiated by gender of the producers of the Campesino Community of Carabuco, located on the shores of Lake Titicaca (Puno region, Peru). The tools used in this research are: the cross section, the activity diagram by gender, analysis of access and use by gender, surveys and semi-structured interviews. The results show a great participation of women in the cultivation of quinoa, harvest and post - harvest (threshing, pre - cleaning, drying, sorting, grading and storing grain) as well as its marketing to local, regional markets , National and international. The woman recognizes the importance of quinoa in the food security of the family from: the preparation of traditional foods such as kispiño, p'esque and soup; non-traditional such as bread and biscuit and new ones as combinations with beans, barley and wheat; the nutritional, medicinal and nutraceutical properties are also valued. Formerly the women of the Campesino Community of Carabuco used the saponin extracted from bitter quinoa as shampoo, detergent and toothpaste. Due to its geographical location, Carabuco has been favored by the climatic conditions of the lakeside zone for the cultivation of quinoa. It is concluded that quinoa is of transcendental interest for the food security of the producers of Carabuco and its production should be promoted as an alternative for development and included in the economic and social development programs.
Keywords: Quinoa, Carabuco, Gender, Development.

INTRODUCTION

This research addresses the access and use of quinoa, differentiating between the participation of male and female producers in the rural community of Carabuco, located at 3,835 m.a.s.l. on the shores of Lake Titicaca (Peru). The official language is Spanish and the native language is Quechua, so the study area is shown schematically through a cross section (Figure 1), which shows from the lowest point of the study area where quinoa is adapted -the shore of the lake- to the highest point of the place -the houses and hills-. The road crosses the entire community; it borders the shore of the lake, integrating Carabuco with other important cities, such as Juliaca, a well-known commercial hub.

In Carabuco, agricultural activity predominates in addition to livestock farming, where each farmer has scattered crops on different types of land, from flooded land on the shores of the lake to irrigated crops on the hillsides; this allows them to change their living space and agricultural production when there are vulnerable situations, such as floods and droughts (Huacani, 2007). The houses are located on the hillsides because of the risk of flooding. The hills are covered with eucalyptus trees, although in some areas these are more dispersed than in others.

Women, accompanied by children, carry out their work in the areas adjacent to the house, livestock and arable land, while in the area of the lake there is a greater presence of men.

The agricultural calendar in the cultivation of quinoa is a determining factor in organizing time; the producers program their quinoa cultivation activities on this basis.

In table 1, the duration of activities is represented by lines of different thicknesses: the thicker line represents intensive activities; the thinner line, permanent activities; and the dotted line, sporadic activities. Men are intensively engaged in irrigation and soil preparation, while women are engaged in planting. Both men and women are permanently engaged in harvesting and post-harvesting. Generally, the women select the seed and market it.

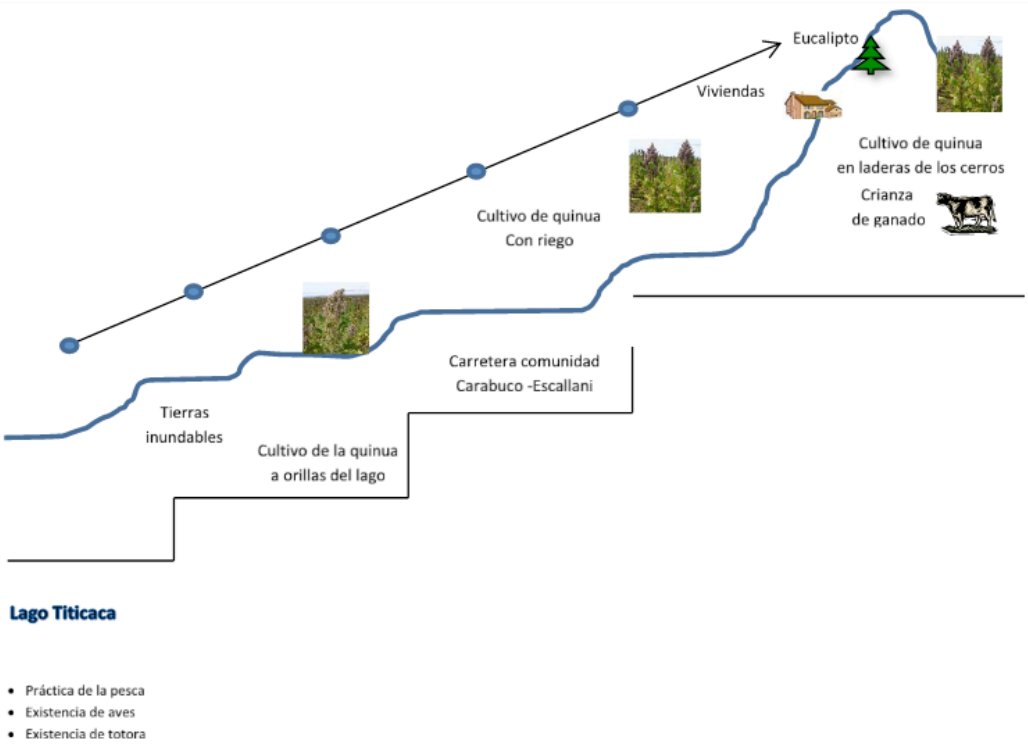

Figure 1. Cross section of the Carabuco community.

Activity	Gender	Location	Period											
			J	F	M	A	M	J	J	A	S	O	N	D
Watering	Males	Near the house												
Soil preparation	Males	Lake shores and hillsides												
Planting	Males	Lake shores and hillsides												
Weeding	Males and females	Lake shores and hillsides												
Harvest	Males y females	Lake shores and hillsides												
Post harvest	Males y females	Lake shores and hillsides												
Seed selection	Women	House												
Marketing	Women	Local Sunday fairs												
Transformation	Women	Lake shores and hillsides												

Note:

Intensive activity

Permanent activity

Sporadic activity

Table 1. Diagram of analysis of quinoa cultivation activities by gender in the Carabuco Rural Community

Source: Information gathered during field work, based on interviews with residents of the Carabuco Rural Community.

Elaboration: Own.

The planting season in the agroecological zone around Lake Titicaca begins on September 24 and ends at the end of October, in some cases until November; harvesting takes place in March, April and May, and post-harvesting is parallel to harvesting. The quinoa is marketed throughout the year. Quinoa is considered by the producers as savings and important for family consumption; quinoa is sold when money is needed to cover the family's basic necessities.

Before we did not sell quinoa, we used to consume it, but now we are selling it because we need money (Agustín, 72 years old).

OBJECTIVE OF THE STUDY

GENERAL OBJECTIVE

To analyze from a gender perspective the production of quinoa in the rural community of Carabuco located on the shores of Lake Titicaca (Puno, Peru).

SPECIFIC OBJECTIVES

To explain the gender-differentiated uses of quinoa in the Carabuco Rural Community, located on the shores of Lake Titicaca.

To describe the gender-differentiated perceptions of quinoa in the rural community of Carabuco, located on the shores of Lake Titicaca.

MATERIALS AND METHODS

The research is quantitative, non-experimental, cross-sectional, the tools used are: cross-sectional, the diagram of activities by gender and semi-structured interviews with 50 producers out of a total of 350 inhabitants of the community. This research details the following sections: differentiation of activities by gender in the cultivation of quinoa, gender and quinoa cultivation, use and consumption of quinoa by gender, medicinal use of quinoa, use of bioindicators in the cultivation of quinoa, perceptions about quinoa and the development of the community.

RESULTS

ADAPTIVE CAPACITY OF QUINOA IN THE CARABUCO CAMPESINO COMMUNITY ON THE SHORES OF LAKE TITICACA

Quinoa cultivation is seasonal and depends on rainfall; however, the community of Carabuco, due to its location in the agroecological zone around the lake (Figure 2), benefits from the microclimate, as there are no intense frosts, producing quality quinoa in three varieties: kankolla, white and pasankalla; the most widely cultivated variety is kankolla (Table 2). One characteristic of the circumlacustrine zone is the existence of smallholdings, which limits the cultivation of large areas of quinoa.

PLANTING, HARVESTING AND POST-HARVESTING OF QUINOA CROPS

Both men and women are aware that the cultivation of quinoa requires soil management, which requires the practice of crop rotation. The women indicate that potatoes are planted first, followed by quinoa and then wheat or beans, and so on each following year so that production achieves greater productivity (Figure 3).

According to the women's experiences, quinoa is planted (planting is done in furrows spaced 40 to 60 cm apart) in dry soil and when rainfall begins, germination, emergence and plant growth is uniform (Care Perú, 2012). It also depends on the time and preparation of the soil, seed quality, fertilization and weed control (Marca, Cancha, Quispe and Mamani, 2011). It is common for women to use seed from the same organic-type harvest. It is cultivated in different areas from the hillside, foothills and lake zone. The technology used

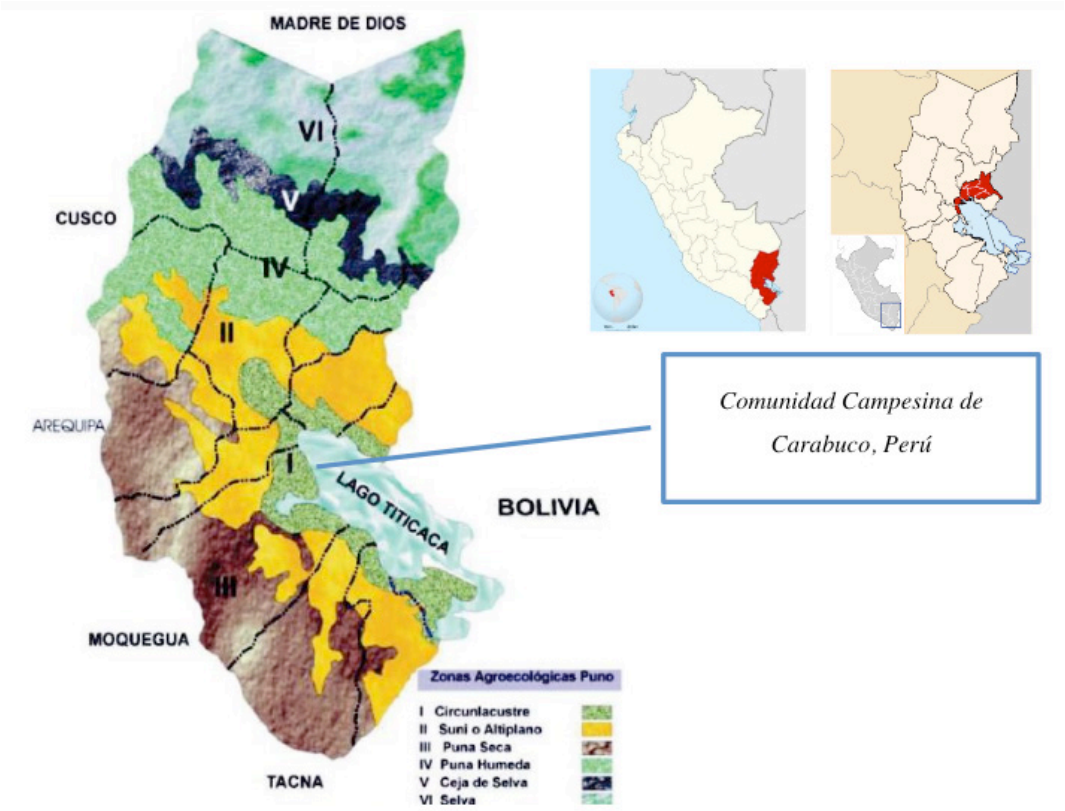

Figure 2. Map of the Puno region - Peru.

Note: Marca (2011). Regional Government of Puno

We women always plant quinoa, we know with our hands how much quinoa we should put in the furrow at the time of planting (Paula, 74 years old).

Variety	Growing season (days)	Grain			Yield (Kg/ha)	Biotic and Abiotic	
		Size	Color	Saponin		Tolerant	Susceptible
Kankolla	170 to 210	Large	White	Bitter	1100 to 2500	Humidity	Hail and flooding
White	160 to 180	Large	White	Bitter	1200 to 2500	Humidity	Hail and flooding
Pasankalla	180 to 200	Large	Light lead	Sweet	2000 to 3500	Humidity	Hail and flooding

Note: Information gathered during field work.

Table 2. Characteristics of quinoa varieties in the Comunidad Campesina de Carabuco

Elaboration: Own.

is manual by the use of tools such as: pico, chaquitajlla, segadera, huajtana, susunas. Quinoa is very susceptible to weeds and this work is generally done by women.

Men and women share the work of harvesting quinoa during the months of March to May, work that is done in the mornings or afternoons since the rest of the day the humidity is higher to avoid shelling or loss of grain. The cutting or mowing of the quinoa is done manually. After mowing the quinoa, men and women make arches to complete the maturation of the grain and the drying of the stalks, leaves and pre-drying of the grain, which is done in the same field. These must be covered to protect from rain and birds.

One problem we have during the quinoa harvest is the abundant pigeons that eat the quinoa grains, even though we cover them with plastic or straw, they always take the grain from us.

In the post-harvest of quinoa, women carry out the following tasks: pre-cleaning, drying, selection, classification, storage and marketing, while men do the work that requires more physical strength, such as threshing, and in some cases women also do this work (Figure 4).

> We protect the quinoa from hail, my grandparents always burned around the farm to make the hail pass and protect the quinoa. We burned with kerosene, with logs and logs, we lit it so that it would not hail. If someone has twin children, we ask the parents that the children shout saying: "pasai pasai totola", all that we do so that the hail does not take away our quinoa harvest, and it is a concern every year (Paula, 74 years old).

The quinoa producers of the Comunidad Campesina de Carabuco market quinoa in weekly fairs (known as k'atos), in small quantities (arroba or 12 kilograms), of different qualities, at different times of the year, mainly as grain, with no value added - traditional system. In Carabuco, quinoa is marketed through intermediaries made up of wholesalers and retailers who frequent the weekly fairs in Taraco and Juliaca (Figure 5). Unwashed quinoa is more widely marketed at the Taraco and Juliaca fairs, although in Juliaca there is significant demand for washed quinoa (for the preparation of quinoa juice, soup, bread, mazamorra and p'esque because it is a commercial hub city in the southern Peruvian region).

An important aspect of quinoa producers with respect to marketing is that it is free of impurities and has a low price in the production and harvest stage, improving in the post-harvest stage, which implies a high demand for the quality itself, and the absence of the use of pesticides attracts marketers to demand organic quinoa from Carabuco (Table 3). In Carabuco, the traditional mode quinoa production system prevails, as it has shown to be sustainable over time, whose production and demand is recognized by the local and regional market (Gómez-pando & Julca-otiniano, 2018).

DISCUSSION

QUINOA USE AND CONSUMPTION BY GENDER IN THE RURAL COMMUNITY OF CARABUCO

According to the community members of Carabuco since ancient times quinoa has provided food security for the family (Nowak et al., 2016). Seventy percent of production is destined for self-consumption based on their traditional customs and because it is considered essential for food. Its importance in consumption is due to two factors: its economic purchasing power and the cultural habits of the rural population in their diet.

Quinoa consumption is valued by men and women due to its nutritional benefits -quinoa for its high nutritional value, can be used as an industrial by-product as a beneficial alternative

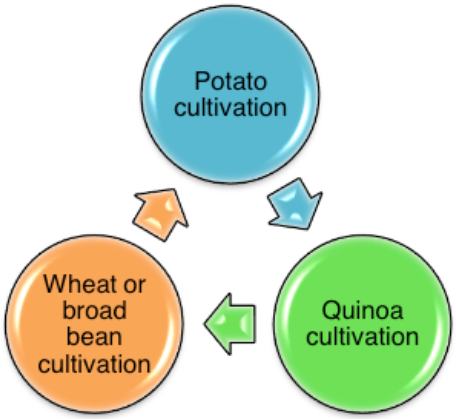

Figure 3. Quinoa crop rotation in the Comunidad Campesina de Carabuco

Figure 4. Post-harvest management by gender in the Comunidad Campesina de Carabuco

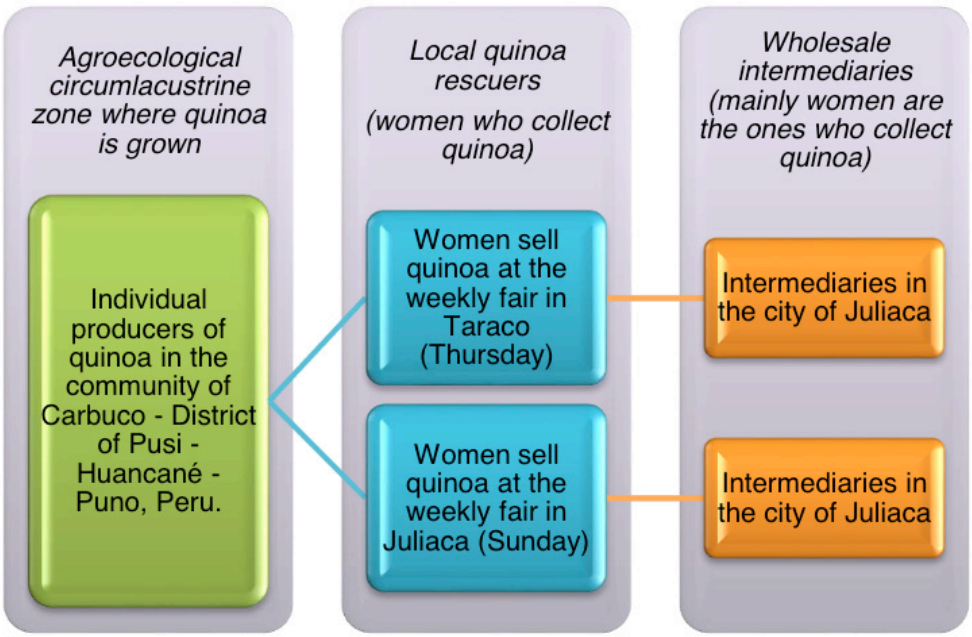

Figure 5. Diagram of quinoa collection in the Community of Carabuco

Stages	Month	Prices
Production	October to march	Low
Harvest	April, may and june	Low
Post – harvest	October to february	High

Note: Field work.

Table 3. Quinoa price behavior in production, harvest and post-harvest stages

Elaboration: Own.

for health (Márquez-villacorta & Pretell-vásquez, 2018)-, medicinal and nutraceutical benefits that are healthy and recommended for pre-diabetic patients (Abellán et al., 2017). It is used in different ways, in soup, seconds, drinks, p'esque, salad, mazamorra, kispiño, phiri, bread -a key aspect to highlight about quinoa bread is that it manages to reduce anemia in children (Soncco et al., 2018)- and cookie, quaker (Table 4). Its use is in whole washed and ground quinoa. In recent years the processed quinoa products are quinoa flour and quinoa flakes .

In the past, the women of the Carabuco community used the saponin extracted from bitter quinoa as shampoo, detergent and toothpaste.

MEDICINAL USE OF QUINOA

Due to the high content of essential amino acids in its protein, quinoa is considered the only food in the plant kingdom that provides all the essential amino acids. According to traditional medicine, the infusion of the leaves is used to treat urinary tract infections or as a laxative. The fresh leaves of quinoa "layo", consumed either in the form of soups or second is the indicated remedy against diseases caused by a lack of some vitamin in the body (PROINPA, 2011). In addition, quinoa broth, soup, or hot graneado is a nutritional tonic, increases mother's milk, repairs strength, and protects against tuberculosis.

USE OF BIOINDICATORS IN QUINOA CULTIVATION

In Carabuco, producers use bioindicators. However, it can be detected that, at present, young farmers are losing the tradition of practicing ancestral knowledge through bioindicators. They do not give much importance to the knowledge to develop quinoa cultivation and if they practice it, they do it in a different way, far from the original knowledge. Adults and elders are aware that there is this loss of knowledge in some of the knowledge related to bioindicators. Women, in particular, preserve hidden knowledge about the use of bioindicators, which they continue to use to carry out activities in quinoa cultivation. This knowledge allows them to predict in which years there will be a good harvest or a shortage of quinoa, and therefore helps them to make decisions in advance regarding the convenience of advancing or delaying the sowing.

> The year that the yellow k'areo blooms in abundance is an indicator for good quinoa production; this bio-indicator helps us make decisions for quinoa cultivation (Paula, 74 years old).

> In flood years there is little quinoa (Victoria, 76 years old).

PERCEPTIONS ABOUT QUINOA AND THE DEVELOPMENT OF THE CARABUCO CAMPESINO COMMUNITY

Quinoa producers perceive that quinoa has been showing changes and challenges due to local, regional and national demand. However, the women indicate that to date they have not received support from public or private institutions for the production, processing and marketing of quinoa (Table 5).

CONCLUSIONS

The producers of the Carabuco Peasant Community (Peru) are favored by the climatic conditions of the lake area for the cultivation of quinoa. Therefore, women play a greater role than men in the whole process of growing and marketing quinoa, which is of transcendental importance for the food security of the inhabitants of Carabuco, and its production should be promoted as a development alternative and included in economic, social, tourism, and gastronomic

Products	How is it used?	Who makes?	If you sell, how do you use the money?	Who decides the use of money?	Place	Frecuency of use
Whole washed quinoa	Quinoa soup 1/.	Woman			Home	Always
	b. Quinoa grains 2/.	Woman			Home	Always
	c. Drinks 3/.	Woman			Home	Sometimes
	d. P'esque 4/.	Woman			Home	Sometimes
	e. To market	Woman	To purchase basic household necessities	Male and female	Weekly fair in Taraco and Juliaca	All year round
Unwashed quinoa	a. Generally sold	Woman	To purchase basic household necessities	Male and female	Weekly fair of Taraco and Juliaca	Troughout the year
Quinoa stems	a. Distribuitedas livestock feed	Male and female			Farm on near home	After harvest
	b. Ad firewood when the stem are dry	Woman			Home	After harvest
Green quinoa leaves	a. In soup substituting for vegetables, as well as in salads	Female and male			They collect from the quinoa farm	When the quinoa is green before harvesting
Ground and flaked quinoa	Mazamorra 5/.	Woman			Home	Always
	Kispiño 6/.	Women and girls			Home	Always
	Phiri 7/.	Female and Male			Home	Sometimes
	Bread and cookie	Male and Female				All saints
	Quaquer 8/.	Woman			Home	Sometimes
	f. For sale aat the local market om fair days	Woman	To purchase basic household necessities	Varón y mujer	Weekly fair in Taraco and Juliaca	Sometimes

Note: Based on information provided by quinoa producers in the Comunidad Campesina de Carabuco, Peru, June 2022.

1/. Quinoa soup: Quinoa cooked with meat or charqui, tubers or vegetables.

2/. Toasted and grained quinoa, replacing rice.

3/. Soft drink, quinoa with milk, quinoa juice and quinoa chicha (macerated cold drink).

4/. Quinoa grains cooked with water and without salt, served with milk or grated cheese.

5/. Quinoa flour with katahui (lime) and milk.

6/. Steamed buns in different shapes and sizes.

7/. Toasted and slightly moistened rough quinoa flour.

8/. Ground quinoa in the form of small leaves used for soup, soft drink, juice, also substitutes quaquer.

Table 4. Analysis of access and use of quinoa in the Carabuco Campesino Community

Males	Females
a. Positive characteristics - They value quinoa for its nutritional qualities in the family's diet, in addition to its grain quality as one of the best in the lake area. - They propose organizing among producers to market quinoa. - They hope to receive training in the management of quinoa processing. - They know, participate and maintain the ancestral customs in the cultivation of quinoa. - They are familiar with the management of flora and fauna bioindicators for quinoa cultivation. - They see Lake Titicaca as an important agroecological zone with a favorable microclimate for quinoa cultivation.	- They value quinoa for its nutritional qualities in the family diet, especially for children. In addition, the quality of the grain is one of the best in the lake area. - They agree that their husbands should organize among producers to market quinoa, despite their commercial development. - They hope to receive training in quinoa management, among other training according to their needs. - They know, participate in and maintain ancestral customs in the cultivation of quinoa. - They are familiar with the management of bioindicators of flora and fauna for quinoa cultivation. - They see Lake Titicaca as an important agroecological zone with a favorable microclimate for quinoa cultivation.
b. Negative characteristics - Individualized supply, low quality, low standardization and poor product presentation, poor market articulation, low associativity among producers. - Low market prices. - They observe the parceling and lack of land. - More and more young people are moving to the cities, providing the quickest solution for better opportunities. - They are responsible for assuming community positions, and machismo still exists. - In spite of having better levels of education than women, they observe low levels of education in rural areas.	- Individualized supply, low quality, low standardization and poor product presentation, poor market articulation, low associativity among producers. - Low market prices. - They observe land parceling and have limitations on possession rights. - More and more young people are moving to the cities, providing the quickest solution for better opportunities. - They do not have access to high-level positions of communal responsibility and are limited in their ability to express their opinions, which is why they are not heard in assemblies. - They complain about the low levels of education; in many cases they are illiterate and want to take literacy courses.

Note: Based on information provided by the quinoa producers of the Comunidad Campesina de Carabuco.

Table 5. Positive and negative characteristics of quinoa in the Rural Community of Carabuco

development programs, and marketing chains should be improved.

Men and women perceive that they should organize themselves to make joint sales as partners, as well as access credit to improve their level of production, and strengthen the quinoa production chain through competitive monitoring, since there is a trend towards mass consumption of cereal-based products (Maria & Quintero, 2014).

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