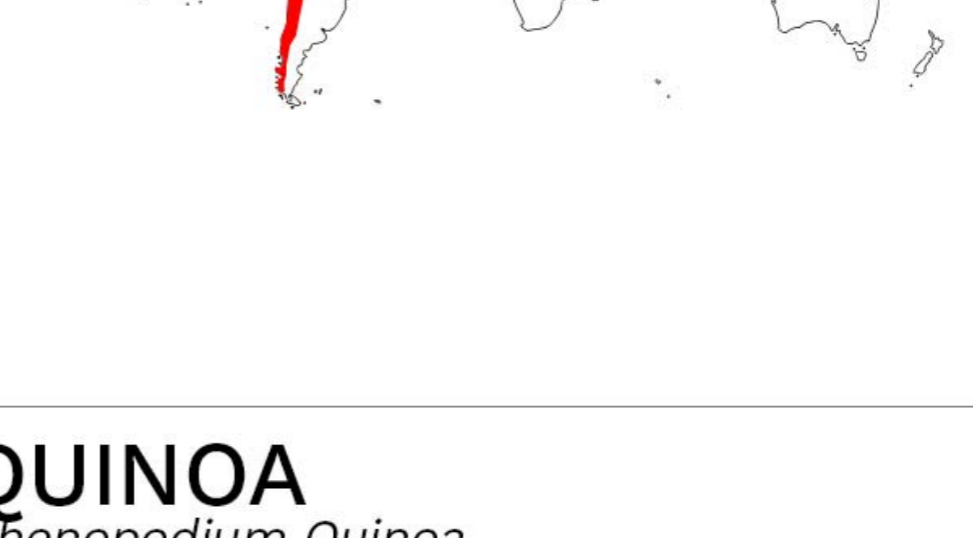


Quinoa and the Reawakened 25

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THE STORY OF QUINOA AND CAÑAHUA IS THE STORY OF TWO SISTERS THAT HAD A VERY DIFFERENT FATE. Quinoa, once a neglected pseudo-cereal, recently rose to the status of superfood and conquered the tables of the world. This celebrity eventually led to new business opportunities for Bolivian farmers. But once it moved to the status of monoculture, things got more complex. Cañahua, on the other hand, is still mostly neglected. It has all the features to be as successful as its sister: tolerance of high mountain conditions, less fat, more protein, and ten times more iron. Nonetheless, cañahua is still extremely rare and there aren't many farmers that decide to cultivate it for the market. However, the fate of the unlucky sister is arriving at a turning point thanks to the work of organizations that are raising awareness about the importance of heritage crops and diversification.



QUINOA

Chenopodium Quinoa

Origin: South American Andes Mountains
Grown across South America
Protein rich seed that withstands frost and salinity; rich in minerals, vitamins, & antioxidants

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BOTANY

Quinoa is an herbaceous annual native to the Andes Mountains in South America. It is a weedy plant that typically grows from three to six feet tall. Its leaves closely resemble those of spinach, and though they can be eaten, it is mainly grown for its nutritious seeds. Quinoa leaves are broad, alternate, smooth to lobed, and medium green in color. Flowers, which bloom in the summer, are apetalous, bloom in terminal and axillary racemes. The seeds of quinoa mature in the fall in indehiscent fruits called achenes. The fruit, depending on variety, often forms in a range of colors from white to red to black (MBG).

Cañahua differs from quinoa both for the inflorescence and the fruits. The inflorescence, which are located on the terminal and axillary cymes, and the flower is small and has no petals. The fruits are small and dark, containing brown or black seeds between 0.5 and 1.5 mm in diameter, and the seeds are dispersed spontaneously. Once they reach maturity, the stem and leaves of the plant change color to yellow, red, green and sometimes purple.

CULINARY USE

Quinoa is a healthy food that can be prepared in a variety of ways similar to rice and pasta. It is an excellent source of energy and fiber and has significant amounts of minerals, most notably iron and zinc. Quinoa can be boiled and added to soups, or as part of other foods to make a meal. It can also be made into flour for bread or drinks. Today it is also made into value-added products like ready-to-eat cereals, pasta, and granola bars. Quinoa is also used as an animal feed in the form of green forage or harvest residue (FAO).

Cañahua can be consumed as rice or reduced to flour for making breads, cakes, snacks and pasta. Roasted cañahua flour, called *cañihuaco*, has a nutty flavor and can be used to prepare a kind of porridge consumed for breakfast by mixing it with water and milk. Today, new technologies and value-added products are being developed to encourage companies to process this crop and encourage its consumption. (Repo-Carrasco 2006)

NUTRITION AND MEDICINAL USE

Quinoa was highlighted by the Food and Agriculture Organization in 2013 to promote it as a useful crop in alleviating world hunger and poverty. It made 2013 the International Year of Quinoa. This in part is due to its nutritional profile. It contains high amounts of protein, amino acids, and other essential minerals and nutrients. Also, quinoa contains isoflavones which are important in improving breast milk. Other flavonoids have been found in quinoa and are important for antibacterial activity (Martínez). The leaves of quinoa have traditionally been used by indigenous people of the Andes to heal wounds, reduce swelling, soothe pain, and to disinfect the urinary tract. They have also been used to reset bones, help stop internal bleeding, and insect repellents (FAO).

Cañahua is rich in carbohydrates, unsaturated fatty acids, and protein and is considered a medicinal remedy that people in the Andean highlands carry with them on long journeys-particularly its stem ash, llipta, used when chewing coca leaves and rich in calcium. The nutritional value of cañahua protein is higher than that of quinoa and equivalent to that of milk protein, with a nutritionally balanced amino acid composition (White et al). Unlike quinoa, which contains saponins with a bitter taste, cañahua can be used directly as a food without being washed. (Repo-Carrasco 2009).

AGRICULTURE

Traditionally, quinoa is cultivated in saline soils, with precipitation ranging from 100 to 2,000 millimeters per year, and in a range of altitudes from sea level to 1,000 meters. Quinoa underwent a domestication process over the past 3,000 years that supported a high genetic diversity, making it possible to select traits that allow for growth in a diverse range of agroecological settings. Quinoa can withstand stressful conditions like frost and soil salinity and water salinity. Salt is rejected either from plant tissues or is tolerated inside cell vacuoles.

Cañahua is a hardy plant that thrives in poor, rocky soils and can survive frost and drought. It can be grown from 1500 m up to 4400 m and usually does not require irrigation. It is a hardy plant that thrives in poor, rocky soils and can survive frost and drought. It is usually unaffected by the snowstorms and strong winds that destroy barley and even quinoa fields. It is said that, when all other crops fail, cañahua continues to provide food for farmers in the highlands, thus ensuring their survival. Cañahua must be harvested at color change, before full maturity, to avoid high yield losses due to seed dispersal. More than 200 varieties are known in Bolivia, but only 20 are still in use and most farmers grow only one.

HISTORY

Quinoa has been cultivated for the past 8,000 years in the Andes Mountains in South America. It adapted to certain geographical areas over time in which there are five major ecotypes. The ecotypes include the Inter Andean Valleys in Colombia, Ecuador, and Peru; the Highlands in Peru and Bolivia; the Yungas in subtropical forests in Bolivia; Salt flats in Bolivia, northern Chile, and Argentina; and Coastal in central and southern Chile. Domestication took a process that involved larger fruit size, higher and more uniform yields, reduced branching, and bigger inflorescence, among others. Quinoa cultivation disappeared about 400 years ago due to the Spanish conquest, but there is a recent ongoing effort to reintroduce quinoa to its native region. The FAO made 2013 the International Year of Quinoa.

Archaeological evidence on the origins of Cañahua is very scarce, so it is difficult to determine when it was first cultivated. However, several historians trace its cultivation to the Tiahuanaco culture, which settled in the highlands of Peru and Bolivia. The earliest account of Cañahua consumption dates back to 1586, when writer Diego Cabeza mentions it as part of the diet of the Urus Indians who lived south of Lake Titicaca. Being a native crop of the Altiplano, it is in this geographic area that the greatest genetic variability is found, so in the germplasm banks, or seed bank, of the National Institute of Agricultural Research (INIA 2002), and the National University of the Altiplano UNA-Puno, there are about 800 samples that protect and confirm its genetic diversity.

RESEARCH

A new research center was established in northern Chile in 2003, the Centro de Estudios Avanzados en Zonas Áridas (Center for Advanced Studies in Arid Regions). Researchers there have been studying the effects of human-induced climate change in this region. They have indicated that average rainfall per year has decreased by about fifty percent in the past century, making it one of the regions with the greatest decrease in precipitation worldwide. After the Spanish conquest quinoa was eradicated from this region and wheat was introduced in its place. Studies have shown that farmers are losing income due to lower yields partially attributable to lower rainfall. In 2007, statistics showed that there were only 300 quinoa farmers in Chile and all ancestral seeds have been lost. The Centro de Estudios Avanzados en Zonas Áridas learned this and began saving seeds from fields across the country, from the Andes to the Pacific Coast. Since then, they have been studying the seeds to determine if quinoa can be cultivated under the current low precipitation conditions. Initial results showed that quinoa produced higher yields when grown in the central and southern regions as opposed to the high Andes. Later, studies showed that quinoa could grow with extremely low levels of irrigation, as long as water was applied at critical stages of the growth cycle meaning that farmers cannot solely rely on rainfall for irrigation (Martínez). In 2017, the genome sequence for quinoa was completed (Acga Chen).

Recently more attention is being paid to research in the field of value addition to canihua, especially for the potential in the food industry. Similar to the success of quinoa and the growing demand in Western countries, cañahua has a growing market potential. In the agronomic field, major research is devoted to breeding to decrease seed loss and increase seed size.

CUISINE

- <https://cookieandkate.com/perfect-quinoa/>
- <https://www.bbcgoodfood.com/recipes/collection/quinoa-recipes>

SOURCING

- <https://www.groworganic.com/collections/quinoa-seeds>
- <https://www.wildgardenseed.com/index.php?cPath=50>

COMMUNITY RESOURCES

- [MBG](#)
- [BBC](#)
- [Repo-Carrasco 2006](#)
- [Repo-Carrasco 2009](#)
- [White et al](#)

RESOURCES

- [Martínez](#)
- [FAO](#)
- [Chenopodium pallidicaule, Plants for the Future](#)
- [Indecopi](#)



THE LEXICON

www.thelexicon.org/agrobiodiversity