UNIVERSITY OF OXFORD

GLOBAL HISTORY OF CAPITALISM PROJECT

OXFORD CENTRE FOR GLOBAL HISTORY

Case Study #25 **November 2022**

Between the Market and the Land: the Mechanisation of Quinoa

Farmers on the agricultural plains of the Andes, which tower 12,000 feet above sea level, are endowed with little arable land. The southern *altiplano* (high plain) in Bolivia endures temperatures far below zero degrees Celsius for at least two hundred days a year, seasoned with up to 250 millimetres of annual precipitation – rain, hail and snow, season depending.[1] For some 7,000 years, the premier crop in the *altiplano* has been a seed (frequently mistaken for a grain) called quinoa. It's a gluten-free nutritious phenomenon: rich in iron, vitamins, minerals, high-quality proteins and amino acids. It is also hardy enough to survive hostile Andean winters.

Figure 1: Threshed quinoa

Historically, quinoa was so important as to be sacred to the Inca people. Tradition held that the emperor himself would sow the first seeds of the season with ceremonial tools made of solid gold. Seeds have been found in indigenous tombs and at significant burial grounds; it fuelled the empire's army and played a role in its religious ceremonies. This considered, it is of little surprise that the Spanish *conquistadores* banned its cultivation, replacing it with wheat cereals in a process of culinary colonialism.[2]

Quinoa survived, and its consumption fluctuated – but persisted – for centuries.

However, its true breakout role came in 2008, when American TV monarch Oprah Winfrey publicly endured a twenty-one-day cleanse (the 'Quantum Cleanse'), of which quinoa was a vital component. Sales surged.

Oprah thrust quinoa into the consciousness and grocery stores of the United States. Her influence should not be underestimated. At the time, she was the world's most-watched talk show host; a billionaire; and "the most important black philanthropist in the US", according to the *Guardian*.[3] In 2007, the *Telegraph* named her the most influential woman in the US election.[4] A study conducted by Maryland economists concluded that Oprah's endorsement of Barack Obama was worth one million votes.[5] She has achieved that rare level of fame at which one no longer needs a surname. It is no surprise that her endorsement of quinoa was worth several million sales.

Oprah devoted hours of highly-scrutinised television and kilometres of pored-over blog text to health food; her content (and audience) fretted endlessly about probiotics, glutens, bloating, superfoods, killer foods, and the horrors of an insufficiently organic diet. The cleanse that brought quinoa to the world was a cold-turkey run at cutting out sugar, caffeine, gluten, alcohol and animal products. Here, Oprah felt, was a gluten-free grain that could do it all – after all, it is the only plant-based complete protein. It is also eminently marketable: the Incas' sacred ancient grain.

Case study prepared by Charlie Harris. Case study editor: Professor Christopher McKenna, University of Oxford.

However, the quinoa industry – ancient, yet static – was unprepared for a demand boom. The resultant surge in production prompted questions about sustainability, globalisation and economic justice. But it may have also undone itself: quinoa was touted as sustainable, affordable and utterly organic, but these attributes seemed inextricable from its antiquity, its perceived rustic simplicity. Modern market pressures have changed quinoa: the same market pressures that undermine consumer health, redirect indigenous wealth and compel a slow creep towards ecological disaster in farming regions worldwide.

The pseudo-grain pseudo-revolution

Quinoa has nearly vanished from soil and shelves more than once. The first recorded time was when Spanish invaders forcibly replaced it with (far less nutritious) wheat cereals, in what at least one scholar called "culinary colonialism"; it occurred again in the 1980s, primarily because of labour shortages – and the labour-intensive nature of quinoa harvesting and processing. Other issues at play were urbanisation, cost and the pejorative marginalisation of food associated with indigenous culture.[6]

By the end of the 20th century, quinoa farmers in Bolivia and Peru were hungry for a revival. A coalition of unionised Bolivian farmers formed the *Asociación Nacional de Productores de Quinua* (National Association of Quinoa Producers, or ANAPQUI) in 1983 in an effort to increase both national consumption and export demand. ANAPQUI operates as a centralised exchange point for smaller farmers, and aims to improve the living conditions of its members by paying a fair price for quinoa. In the late 1990s, its main aim was to increase export potential: in 1997, the export market purchased 1.4% of Bolivia's quinoa. By 2000, this reached a historic high of 8%.[7] At the time, it seemed to be quite a victory for this niche staple seed from the *altiplano.*

Quinoa remained a staple food in South America – especially in Andean nations. In a historical irony, when the king and queen of Spain visited Peru in 1987 they lauded quinoa, leading to a small sales boost amongst Lima's elite who had long considered quinoa a lower-class food. In the 1990s, quinoa crept onto English-speaking shelves (primarily in North America) as a niche health food. Sales plodded slowly on until 2008, when Oprah did what ANAPQUI (and the Spanish royal family) could not. Export sales climbed, year after profitable year. In 2007, the United States imported 7.3 million pounds of quinoa. By 2013, this had soared to 60 million pounds.

Quinoa was a sudden craze. Consumers in major cities had long been able to find it in health food stores and organic grocers, but now it was available nationwide in Costco and Safeway, Walmart and Kroger. Quinoa was prominently featured on menus and in cookbooks; and it was almost entirely sourced from Peru and Bolivia. Farmers, unsurprisingly, struggled to keep up.

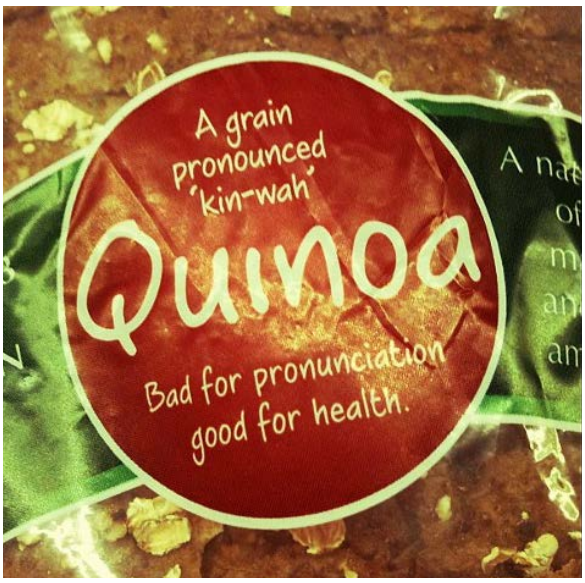

Figure 2: An American quinoa package

Capitalising on a "superfood" trend, quinoa sales exploded at a rate wildly out of step with production. The seed had moved – from being perceived as a basic food in a generally poor region to an upper-class status symbol in wealthy regions. The laws of supply and demand – plus the pragmatic, capitalistic realities of trading with far wealthier nations – led to prices skyrocketing. Oprah shared her cleanse in 2007. By 2013, the price per pound had tripled.[8]

Quinoa was in ascendance: the UN named 2013 "the international year of quinoa". Controversy stirred. It was certainly the international year of quinoa op-eds. The story was that Westerners, infatuated with the staple seed, were driving up the prices locally to the point that a traditional diet became untenable for those who had relied on it for millennia. It became the focal point of a small culture war, encompassing as it did the perennial controversies of globalisation, indigenous justice and diet culture.

Britain's *Guardian* newspaper condemned quinoa buyers in wealthy nations: "the appetite of countries such as ours for this grain [*sic*] has pushed up prices to such an extent that poorer people in Peru and

Bolivia, for whom it was once a nourishing staple food, can no longer afford to eat it".[9] The *New York Times* interviewed a fifty-year-old street vendor from La Paz, Bolivia, who said she could no longer afford quinoa – which she loved – at the market. The article reported that, as the price had tripled, the rate of consumption of quinoa in Bolivia had declined by 34%.[10] The pseudo-grain was becoming indigestible to Western sensibilities, even as countering articles emerged (from National Public Radio: "Your quinoa habit really did help Peru's poor").

Meanwhile, reporters at Toronto's *Globe and Mail* ran contradictory articles. On 13 January 2013 they ran a story imploring readers to "cut back" on quinoa to "stabilize the market and ensure it is available – at a fair price – to all". They fretted that Andean consumers were turning to less nutritious, wheat-based alternatives to quinoa.[11] Three days later, the same paper ran an opinion piece in which Canadian journalist Doug Saunders explained, authoritatively, that the Andean economy "is almost entirely agrarian" and that "the quinoa price rise is the greatest thing that has happened to them".[12]

The impact should, theoretically, have been predictable. Nobel prize-winning economist Angus Deaton provided a theoretical framework in 1989: "net buyers of a commodity are made worse off and net sellers better off, at least in the short run, by an increase in the price of that commodity".[13] But this is an incomplete vision. Would affluent consumers in Los Angeles really be made worse off by a price increase of an occasionally-consumed health food? It seems unlikely; and it also seems unlikely, in a reality not necessarily occupied by economists, that a poor region of Latin America could be made much better off by unstable price fluctuations of a staple good.

The debate raged on, in search of a neat conclusion. The reality, of course, is complex: the increase in price benefited some, while others struggled. Maryland's Towson University conducted one of the most thorough studies into the topic, using ten years of data from a "large-scale, nationally representative" Peruvian national household survey to analyse household welfare in relation to the price of quinoa. Overall, the study concluded that the increased demand and associated price hike had "beneficial effects for consumers as well as for producers of quinoa in Peru".[14] The higher prices did not seem to deter consumers; the data implied that the increasing prosperity of Andean growing regions – historically amongst the nation's poorest areas, not least because of anti-indigenous racism – increased national wealth sufficiently to offset the small price hike. Consumption of quinoa kept trending upwards, even during the most intense price increases. For every 1% rise in the price of quinoa, Peruvian household welfare increased by 0.07%. The report concludes that "these findings should assuage rich-country consumers' concerns about whether their growing demand for quinoa is having a negative influence on Andean households".[15]

Agricultural sustainability and Andean ecology

While journalists may have exaggerated the economic impact, they undoubtedly minimised the environmental impact. Between 2008 and 2014, Andean farmers transformed their growing practices – capturing more value, but creating longer-term environmental costs.

Previously, quinoa farming was largely done by individual operators – small family businesses with a relatively small parcel of land, on which they farmed quinoa intensively but alongside other traditional crops such as maize and potatoes.

However, understandably seeking to maximise profits, farmers began uprooting their other crops in favour of intensively farming quinoa as a monocrop. The process took place with unusual rapidity. In many cases, communities that grew no quinoa at all in 2008 were devoting the majority of their arable land to the crop by 2012.

This had a number of local effects. Firstly, monocultures beget monocultures: the monocropping of quinoa led to a specialisation of other villages in llama and sheep livestock, to produce manure for quinoa fertilisation. These villages face many similar ecological and economic problems to their quinoa-focused counterparts: not only are they contributing to the degradation of their own immediate environment, but they are also vulnerable to changes in consumer preferences, poorly positioned for adaptability should the quinoa fields fall on hard times.

The changes were also socially disruptive. In Bolivia, for example, many villages still organise their arable land as "commons" – a method that was once the norm in Europe, before the enclosure movements of the 13th and 15th centuries.[16]

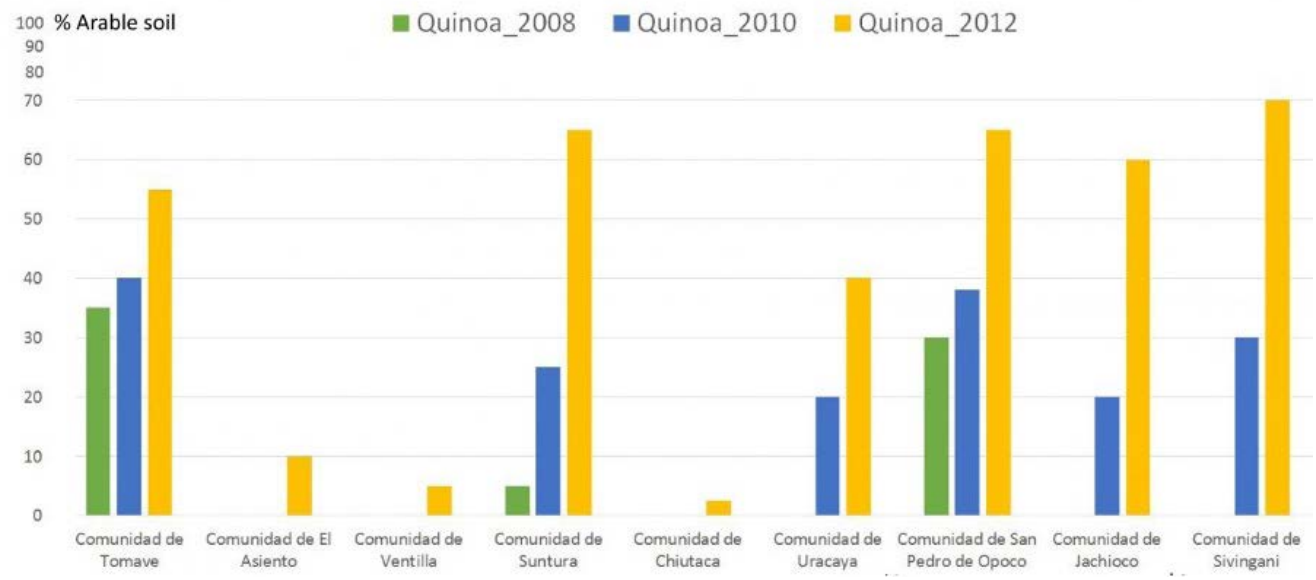

Figure 3: Table showing regional soil use by year

Commons rely on communal, shared land ownership relying on consensus rather than on private property. Changing agricultural practices, however, began to challenge traditional land use, causing upheaval and hardship in the name of increased productivity. The changing method of land tenure has prompted cultural shocks in Bolivia's less-developed quinoa-producing regions.[17]

The rise in demand has also led to quinoa spreading beyond its natural habitat. By 2014 Peruvian farms at lower altitudes were planting more and more quinoa to meet demand (in 2004, Peruvian farmers grew 44,000 tons of quinoa; in 2014, they grew 114,500 tons).[18] Yields are often greater in coastal regions, but with hidden costs: the higher temperatures and humidity encourage more diseases and pests, which in turn encourage the use of agrochemicals. This has a destructive effect on regional ecosystems. Furthermore, the coastal farms are newer, and less likely to be formed of cooperatives of smaller farms. They are producing the cheapest quinoa available, and pose the biggest threat to Andean agricultural livelihoods.

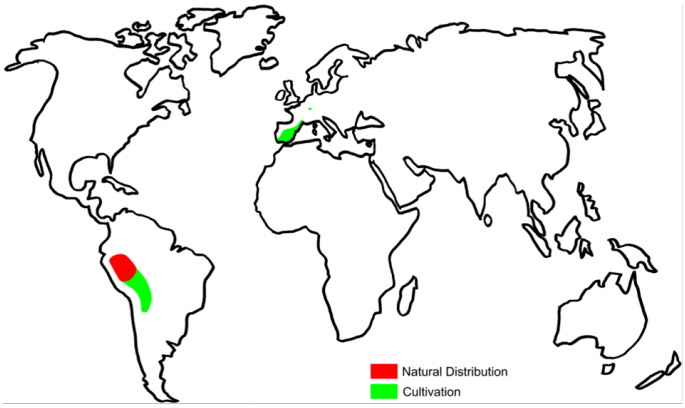

Figure 4: Map showing quinoa's natural distribution alongside its cultivated range

Ironically, intensive agriculture is also stripping quinoa of its health benefits. The sheer scale of demand is changing the way in which it is farmed; and, by extension, the benefits it brings to the body. Soil and the human gut actually contain similar numbers of active microorganisms, and researchers at the Institute of Soil Science have suggested that there is a close link between soil microbiomes and intestinal microbiomes. The Institute has noted that soil biodiversity is decreasing, as a result of intensive farming, agrochemical use and – in particular – low plant biodiversity. At the same time, it is observed that gut biodiversity is fast declining in the intestine of the human body.

As well as monocultures and intensive agriculture, the team pointed to "little contact with soil and faeces, hygienic measures, antibiotics and a low fibre diet of processed food" as culprits. Gut health goes beyond digestion: the microbiome has been linked to maintenance of the central nervous system, mental health, cancer risk, and almost every other human health metric besides.[19]

The genetic bottleneck

Over its 7,000 years of domestication, quinoa has diversified into very many genetically-distinct forms. Andean farmers, across millennia, have bred and adapted quinoa to enhance specific attributes, whether related to flavour, yield, or environmental suitability. At first glance, adaptive breeding for yield and disease resistance may seem to be nothing more than healthy innovation; however, the continued genetic diversity of the seed is crucial for maintaining both ecosystem health and farmer livelihoods.

Exogenous market pressures have created a genetic bottleneck on the *altiplano*. Larger foreign markets have intensified an emphasis on yield and consistency, and many varieties have already disappeared. Quinoa production experienced bottlenecking during both the Spanish conquest and the recent agricultural boom.

The disappearance of ancient land races threatens local ecosystems. In a UN report on quinoa, researchers noted that high crop diversity (often referred to as agrodiversity) is vital for "agro-ecosystem resilience, maintenance of soil and water quality, [and] maintenance of indigenous knowledge". It went on to note that "markets capture only a part of the value of these resources, thus underestimating their true worth".[20] Pollinators and biotic soil processes are sensitive to small genetic variations; and the practice of planting quinoa for yield rather than for ecosystem suitability incentivises higher use of pesticides and agrochemicals to ensure steady growth, which has further implications for wildlife and the water table. This is a particular risk in Peru's larger coastal farms, where quinoa is not readily-adapted and is far more susceptible to pests; here, agrochemicals are more likely to find their way into the ocean, causing further environmental damage. Some of this damage is quantified; much likely manifests in ways that have not yet been observed or understood.

There's a multiplier effect to consider: as farmers increasingly turn to monocropping, they discard other crops that were once grown alongside quinoa. This means that not only is quinoa's genetic diversity diminishing; so is the genetic stock of other Andean crops, the loss of which could well be serious. The whole process could constitute an ecological cascade effect, in which secondary extinctions are triggered by the loss of an initial species; the actual scale of the loss is almost incalculable.

In 2013, as seed diversity diminished on the *altiplano*, the UN proposed a market solution consisting of voluntary payments to maintain existing land races. The idea is that farmers who incur the "conservation cost" (the loss of income associated with growing a lower-yield but more sustainable variety) should be compensated by another organisation in order to capture the market value of biodiversity. The report hails it as an innovative solution, but so far payments have not been forthcoming. A countering article insists that "the neoliberal market paradigm alone is highly unlikely" to lead to the kind of sustainable practices and standards of living that growers hope for.[21] Agriculture often finds itself pulled between the demands of the land and the demands of the market.

Figure 5: Farmers threshing quinoa in Peru

Patents pending

Quinoa intersects not only with environmental threats, but legal ones: including the patenting of genetic characteristics. In 2019 there were 12,000 patents held on plants worldwide, many by huge corporations such as PepsiCo and Bayer-Monsanto.[22] This has led to a practice that critics call "biopiracy", in which the legal rigidities of patents collide with the more flexible realities of nature. For example, in 2012, Monsanto discovered that an Indian variety of melon was naturally resistant to a certain virus. Monsanto scientists bred the trait into other melons, and the company successfully applied for a patent – after which not only did the specific melon belong to Monsanto, but so did every other melon variety containing the same genetic trait. This extended back to the melon in which the trait originated, which had not been developed by Monsanto.

Although the EU eventually revoked the patent, similar practices are widespread. In 2019, an Indian farmer planted a potato variety known as FC5, which he claims was derived from leftover seeds from a previous harvest. PepsiCo holds a patent on FC5, which it uses to make Lay's potato chips. The company sued the farmer for $140,000. The farmer, who allegedly did not know the seeds were patented, earns around $3,500 a year.[23]

Patent conflicts also arise when proprietary pollen from nearby fields, carried by the wind, contaminates another farmer's crop – leading to inadvertent (but legally problematic) agricultural espionage.

Some quinoa producers are concerned that the loss of heirloom diversity in quinoa seed stocks, in favour of bred varieties with greater yields, could lead to multinational corporations gaining greater power over Andean growers. The UN report cited above notes that maintaining genetic diversity is vital to the prevention of biopiracy and crop resilience to disease and unexpected weather conditions.[24] Monocultures risk obliteration from even a brief period of unpredictability; diversity, however, breeds resilience – both economic and environmental.

Yet crop modification may also be the key to feeding the world's growing population. Long-term planners, both private and public, live in fear of the "Malthusian trap" – the belief of Victorian Thomas Malthus that population expansion could exceed agricultural production. As the ratio between population numbers and arable land becomes ever more slim, the search for solutions grows more frantic. The Industrial Revolution extended the deadline by increasing productivity; genetic modification could push it back even further. Malthus' theory has other detractors: the UN predicts that population growth will slow, perhaps even peaking in 2100 at around 11 billion. However, Malthus did not account for climate change, which is expected to dramatically reduce arable land. The spectre of Malthusianism still hovers over agricultural policy; but quinoa could represent a vital solution. Its nutritional content and ability to grow in marginal conditions could make it critical to feeding a growing population – in an increasingly inhospitable world.

In 1994, a special patent was filed in the US: number 5,304,718. Researchers at Colorado State University had developed (rather early, for the American market) a strain of quinoa that could be an important step towards a hybridised version of the crop – which, in short, would make subsequent genetic engineering of quinoa far easier. The researchers argued that quinoa's ability to grow in inhospitable conditions made it a vital tool to offset climate change. However, the seed from which the new version originated came from the *altiplano*. The head of ANAPQUI wrote an open letter in which he and other representatives of the Andean quinoa industry pleaded with the world "not to recognize this patent because … the knowledge and maintenance of its genetic diversity is the property of the indigenous peoples of the Andes".[25] A delegation of ANAPQUI representatives travelled to the United States to make their case.

Quinoa farmers of the *altiplano*, attuned to corporate threats, became possessive of the seed's genetics – to the point that in 2009, Bolivian President Evo Morales nationalised ownership of genetic resources in the country's new constitution. In 2011, ANAPQUI created a kind of appellations program, similar to the regional protections for French wines, to preserve Bolivian *altiplano* growing traditions. Quinoa Real, or Royal Quinoa, denotes quinoa grown by members of ANAPQUI or an associated cooperative; Quinoa Real is a collection of up to ten seed varieties, all planted together to offset the risks of monocropping.

Figure 6: Bolivian producers display dishes containing Quinoa Real in La Paz, 2014

Colorado State quietly let the patent expire, but there are other researchers in North America working towards the same goal. At Utah's Brigham Young University, one such researcher – who was once a Monsanto executive – has been working to involve his former employees. His team envisions American-grown quinoa "in every Walmart in America". The same is happening around the world. One company named Quinta Quinoa in Ontario, Canada, began selling its product in 2015. It claims to produce "the most nutritious quinoa on the market".[26]

Future food fads

The new millennium's biggest superfood didn't have to be quinoa. Despite the seed's many health benefits, it is not as unique as organic grocers might have you believe. In Ethiopia (and, to a smaller extent, Eritrea), the grain of choice is teff. Like quinoa, teff's low glycaemic index makes it suitable for diabetics; it also carries twice the iron and triple the calcium of its Andean counterpart. In 2006 – before Oprah evangelised for quinoa – the Ethiopian government banned the export of raw teff; rising grain prices prompted fears of a food crisis, and the state wanted to ensure domestic food supply in a country that has weathered devastating famines in the past. In 2012, the ban was lifted. Foreign demand has increased by 7 to 10% per year ever since.[27]

While farmers understandably seek to rise above the level of subsistence, the market pressures that come with successfully exporting agricultural products can threaten the long-term arability of the land, and the people that live on and from it. While the Ethiopian government has – perhaps wisely – guarded against the potential issues of food scarcity that could follow sudden food fads, it has not engaged with issues of soil degradation and pesticide use, which are both on the rise. Meanwhile Sophie Sirak-Kebede is the Ethiopian co-owner of Tobia Teff, a North London-based teff import company. "Ethiopian teff will be known for its quality, just like coffee," she told the *Guardian* in 2016. "You can find similar weather somewhere else, but it's the soil that makes the difference. And you can't replace the soil."[28]

The *altiplano* shows the local costs of an export cash crop. Intensive quinoa farming has degraded the land so severely in some parts of Peru and Bolivia that it has caused desertification. The farmers of the Andes are discovering that Sirak-Kebede's boast may be more of a warning. You can't replace the soil. Global markets, however, can – up to a point. For now, Ethiopian soil is as replaceable as Andean soil, which was as replaceable as the once-productive Southern Prairies of the United States; now better known as the Dust Bowl.

Endnotes

[1] Jon Hellin and Sophie Higman, "Crop Diversity and Livelihood Security in the Andes", *Development in Practice*, 15:2 (2005), 166.
[2] UN FAO, "State of the Art Report on Quinoa around the World" (2013), 17.
[3] https://www.theguardian.com/media/2007/jan/03/broadcasting.schoolsworldwide
[4] https://www.telegraph.co.uk/news/worldnews/1435442/The-most-influential-US-liberals-1-20.html
[5] https://freakonomics.com/2008/08/06/so-much-for-one-person-one-vote/
[6] Hellin and Higman, "Crop Diversity", 167.
[7] Ibid, 171.
[8] Marc F. Bellemare, Johanna Fajardo-Gonzalez, Seth R. Gitter**,** "Foods and Fads, The Welfare Impacts of Rising Quinoa Prices in Peru", World Development (2018), 2.
[9] https://www.theguardian.com/commentisfree/2013/jan/16/vegans-stomach-unpalatable-truth-quinoa
[10] https://www.nytimes.com/2011/03/20/world/americas/20bolivia.html
[11] https://www.theglobeandmail.com/life/the-hot-button/the-more-you-love-quinoa-the-more-you-hurt-peruvians-and-bolivians/article7409637/
[12] Doug Saunders, Toronto *Globe and Mail*.
[13] Bellemare et al., "Foods and Fads", 2.
[14] Bellemare et al., "Foods and Fads", 5.
[15] Bellemare et al., "Foods and Fads", 26.
[16] https://grain.org/en/article/6529-digital-fences-the-financial-enclosure-of-farmlands-in-south-america
[17] https://www.thenatureofcities.com/2016/02/18/resilience-and-the-butterfly-effect-could-a-grain-of-quinoa-from-bolivia-influence-barcelona-city-resilience/
[18] https://heated.medium.com/the-biggest-threat-to-andean-quinoa-farmers-isnt-hipsters-and-soccer-moms-it-s-industrial-quinoa-81cb43b173f1
[19] https://pubmed.ncbi.nlm.nih.gov/31450753/
[20] UN FAO, "State of the Art Report on Quinoa around the World" (2013), 121.
[21] Hellin and Higman, "Crop Diversity", 9.
[22] https://www.dw.com/en/patents-on-plants-is-the-sellout-of-genes-a-threat-to-farmers-and-global-food-security/a-49906072
[23] https://www.dw.com/en/patents-on-plants-is-the-sellout-of-genes-a-threat-to-farmers-and-global-food-security/a-49906072
[24] UN FAO, "State of the Art Report on Quinoa around the World" (2013), 121.
[25] https://harpers.org/archive/2014/05/the-quinoa-quarrel/
[26] https://quinta.ca/wp-content/uploads/2017/11/Top-Crop.pdf
[27] https://edition.cnn.com/2015/12/18/africa/ethiopian-superfood-teff/index.html
[28] https://www.theguardian.com/sustainable-business/2016/oct/14/teff-quinoa-ethiopia-boosts-exports-food-africa