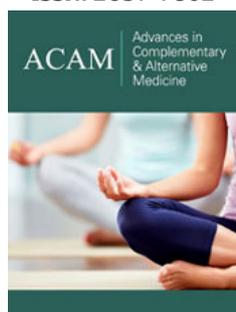


Nutraceutical Uses and Ancestral Knowledge of the Quinoa (*Chenopodium Quinoa Wild*) and Wild Relatives in the Food of Andean Native Peoples

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Abstract

Quinoa, ancestral grain, is medicine and basic food of the Andean man, for the ideal balance of essential amino acids, other nutrients for normal development and growth, has nutraceutical, orthomolecular, anti-aging, anti-stress and medicinal qualities. The research methodology was the accompaniment and exchange of knowledge with bilateral information flow and ethnographic approach (continuous ethnobotanical-anthropological exploration, with exchange of bilateral and multilateral knowledge) in Andean communities, for 14 years (2005/2019), the ancestral medicinal uses given to quinoa by Andean man so far are to: treat broken bones, twists, dislocations, blows and fortify bones (contains quadruple Ca that corn and triple rice, easy to absorb), contains lithium avoiding stress and sadness, galactogenic increasing milk secretion in mothers, prevents uterine cancer, menopause problems for their phytoestrogens (Daidzein and cinesteine), prevents osteoporosis, organic and functional alterations that produce the lack of estrogen, contributes to curing TBC by having protein of high biological value, ideal balance of essential amino acids and elevated lysine, shaping cells, tissues and organs of the human body, regulates cholesterol levels by dietary fiber content and unsaturated fatty acids (oleic acid, linolenic, linoleic), being fiber 6% of weight of the grain, its intake favors intestinal transit; contains antioxidants: betalains, betazhantine to preserve health, is energy source for muscles, brain, nervous system, for containing Alanine, plus Glycine acting as brain tranquilizing neurotransmitter, regulating motor functions and Proline, participant in joint repair and healing injuries; anaemia by content of iron; saponin prevents polyglobulin for its hemolytic action; native varieties and wild relatives are used in food [1-28], medicine [2,29], flavorings, dyes, seasoning, ornamental, biocides and for cultural aspects, local preferences, taste, texture, smell, color; grains and plants used in ritualities counteracting teluric diseases (magical-religious plants) and biological indicators.

Keywords: Chenopodium; Medicinal uses; Nutraceutical knowledge; Original peoples

Introduction

The ancestral nutraceutical knowledge of the original peoples has been characterized by being a baggage and cumulative acquis of knowledge, knowledge and beliefs, which evolves by adaptive processes and that is transmitted culturally from generation to generation. The native Quechua, Aymara and other peoples of the Andes, cultivate and use different functional foods between grains, tubers, roots, fruit, aromatic, medicinal and others [1]: Llama meat, Llayta (Algae, *Nostoc* sp.), Chacco (clay with alumina, silica, magnesium, which increases digestibility and counteracts harmful effects of phytotoxins consumed in your diet), Coca (*Erythroxylon coca* Lam.), Llipta [2]; among the andean ancestral grains we have: Quinoa (*Chenopodium quinoa* Willd.) which allows them to maintain good health, despite the difficult conditions of height and inter-Andean valleys, because, in addition to being functional foods, they are produced in shape using traditional cultivation, transformation and preparation technologies, providing adequate nutrition and health conservation [3]. The ideal balance of essential amino acids and high content of Lysine in ancestral Andean grains, allows them adequate nutrition, the very high content of lysine is appreciated an amino acid generally missing in vegetables and highly potentiated in the quinoa, which is responsible for the formation of the brain in the

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early stages of human development, giving this food an exceptional nutritional value and formator of man's brain tissue [4], so it must be given as food children and adults who wish to maintain good nutrition and adequate feeding, as well as vegetarian and celiac; consuming fresh leaves and panojas, provides vitamins for the normal functioning of your body, the content of Ca, Mg, Zn, Cu, P, K, Fe, prevents osteoporosis and allows the strengthening of bones and teeth, the content of Iron associated with vitamin C, prevents anaemia, quinoa saponin controls the polyglobulin proper of the height due to lack of oxygen [5], the katawi prepared with quinoa and menopause disorders and consequently breast cancer, due to the Daizeine and Cinesteine phytoestrogens that are available in this preparation, natural dyes: betacyanine, bethazantine and betalains prevent cancer stomach and intestines, the high dietary fiber prevents constipation and eliminates harmful cholesterol, the content of unsaturated fatty acids: oleic (Omega 3), linoleic (Omega 6), linolenic (Omega 9), eliminates cholesterol harmful to health and promotes vital brain functions [6].

Andean man to counteract the effects of height has undergone anatomical and physiological changes in his body that allow him to cope with hypoxia and metabolism in height (heart, lungs, larger colon, greater number of red blood cells, etc.). Seeds, leaves, stems, ash, dyes, saponin are used medicinally to cure more than thirty-nine human ailments and conditions, the form and amounts of use of which are well known to the natives of the highlands and cold of the Andes of America, making rational use of geographical space and soils more suitable for cultivation and use not only for human consumption, medicine, other uses but also for the commercialization of the product in local, regional, national and external markets [7], (Janpirunas, Callahuayas, Teguas, Laiccas and Kamiris), mainly from Peru, Bolivia and Ecuador [8] and 28 different forms of traditional food use; among the ailments that can be fought we have: abscesses to the liver, liver conditions, dental analgesics, angina, anti-febrifusus, dressings or poultices, soothing and deflating, urinary tract cataract cataract, caustic for wounds and sores, healing, concussions and concussions, diuretic, galaclophore, internal bleeding control, dislocations, insect repellent, resolute, stomach saburras, internal suppurations, vermifug and vomiting [9].

In the Andes, this diversity and variability is available, since the sustainable use of agrobiodiversity has been practiced by the Andean ancestral cultures since pre-Columbian times and not only of the cultivated food plants, but of their ancestors or wild relatives that are also used as food and medicine, having made modifications to the environment for conservation and future use such as platforms, warus, ccochas, courts in which, food is produced and counteracts adversity climate change [10] and 28 different forms of traditional food use; among the ailments that can be fought we have: abscesses to the liver, liver conditions, dental analgesics, angina, anti-febrifusus, dressings or poultices, soothing and deflating, urinary tract cold, caustic for wounds and sores, healing, concussions, diuretic, galaclophore, internal bleeding

control, dislocations, insect repellent, resolute, stomach saburras, internal suppurations, vermifug and vomiting. In the Andes, this diversity and variability is available, since the sustainable use of agrobiodiversity has been practiced by the Andean ancestral cultures since pre-columbian times and not only of the cultivated food plants, but of their ancestors or wild relatives that are also used as food and medicine, having made modifications to the environment for conservation and future use such as andenes, warus, ccochas, canchas in which, food is produced and counteracts adversity climate change, similarly, aynokas, mandas, laymes (ancestral peasant organization systems) are used to preserve the diversity and variability of species and varieties, as well as conserve soil, make rational use of fertility, avoid the greatest incidence of pests and diseases and achieving production security, food and logically food sovereign, through an adequately established and consolidated communal organization [11]. In Andean food, piri or jaqu (roasted flour and quinoa ground), is used for breakfast, baking and biscuiting, making sweets and refreshing drinks; fresh and tender leaves are consumed as leafy vegetables in place of spinach and chard with better nutritional values, tender inflorescences such as inflorescence in which they replace cauliflower or broccoli, and mature red inflorescences from quinoa as colorings to use as a vegetable coloring of meals and also to dye clothes especially Cuchiwila and Ayrampo, which gives a very intense garnet color to meals or drinks [12].

In the medicinal aspect, quinoa is used, because of the high iron content, associated with vitamin C, prevents anemia especially in pregnant and nursing mothers [13], avoids stress, grief and melancholy for having in its lithium composition, flour dissolved in water with a little vinegar is ingested for the treatment of typhoid fever, to counteract altitude sickness, combats dysentery, ash and stem, against the bite insects and arachnids, the use of flour to control those suitable in the mouth and tongue produced by the inner heat [14]. Also in the Andean worldview, quinoa is used for ritual purposes such as Ispallas, against karisiri (Andean character that draws fat from humans for ritual and cosmetic purposes) and also against bad winds (Machu huayra) and as fodder, using all the because it is high in protein [9,15]; also the original villager, periodically migrates to the jungle or coast to carry out work of coca harvesting, coffee and temporary agricultural employment, promoting its recovery, oxygenation and consumption of foods different than the usual and missing in height [15]. The native Andean villager, uses wild relatives and other native plants in his daily diet such as the kispino of the wild quinoa called Ayara, to avoid stress and melancholy because of the content of Lithium, the leaves of quinoa as leafy vegetables, concluding that andean man uses all the cultivated and wild diversity and variability available in his food and health conservation [16], since food in the Andean worldview is sacred and worships. The lesson learned indicates that Andean food is based on functional, natural, organic products, maintaining adequate health, therefore the best medicine is healthy food and produced in natural conditions, without the use of fertilizers or chemicals products [17].

Materials and Methods

Materials

Morphological descriptors of quinoa [18], herbarium of wild quinoa relatives [19], portable recorder, camera, computer, double traction truck, GPS, altimeter, field backpack and bag sleeping.

Methods

The research methodology used was the accompaniment and exchange of knowledge with bilateral information flow and ethnographic approach (continuous ethnobotanical-anthropological exploration during the production process, with exchange of knowledge in communities originating in the Peruvian highlands and Andean area [20], during fourteen agricultural campaigns (2005 to 2019), located at 3,850 meters above sea level and contrasting with available chemical information on nutritional content and existing nutrition tables in Andean countries.

Table 1: Species, common names of cultivated quinoa and wild relatives used in food, medicine and ritual uses in the Andes.

Specie	Common Names	Wild Relatives	Food Uses*	Medicinal Uses**	Ritual Uses***
Quinoa (<i>Chenopodium quinoa</i> Willd.)	Quiuna, Quinoa	<i>C. ambrosioides</i> L.	x	x	x
	Jiura	<i>C. insisum</i> Poir.	x	x	x
	Jupa	<i>C. hircinum</i> Schrad.	x	x	
	Shupa	<i>C. petiolare</i> Kunth	x	x	
	Jhupa	<i>C. quinoa</i> subsp.	x	x	x
	Kinwa	<i>melanospermum</i> Hunz.			
	Dawe, Suba [22].	<i>C. carnosolum</i> Moq.	x	x	x

Table 2: Parts of the plant, wild relatives, phenological phase, common name and agroecological zone used in quinoa feeding by popularions originating in the Andes.

Parts of the Plant	Quinoa	Wild Relatives	Phenological Phase of Use	Common Name	Agroecological Zone
Leaves	X	X	Before flowering	Llipcha, Liccha, Chiwa, Atacco	Valles interandinos, Altiplano, Suni, Quechua, Valles costeros
Tender stems	X	X	Before flowering	Llipcha, Chiwa, Atacco	Valles interandinos, Altiplano, Suni y Quechua
Inflorescences	X	X	Star pantyig to milk grain	Llipcha, Chiwa, Killuptata.	Valles interandinos, altiplano
Tender plant	X	X	To ramification	Llipcha, Chiwa	Valles interandinos, altiplano
Seeds	X	X	Physiological maturity	Katawi, Paruja, Pesque, Kispifio, Phisara, Kusa, Lawa, Piri, Ullpu, Ajja, etc.	Valles interandinos, Suni, Quechua, Altiplano, Cordillera.
Saponin	X		After of the desaponification	Posqo, Kallku.	Altiplano, Suni, Cordillera
Ash	X		After harvest (from the root)	Usppa (to make llipta o llupta)	Valles interandinos, Altiplano, Suni y Cordillera
Coloring	X	X	After threshing (Grain less of the inflorescence)	Cuchiwila, Ayrampo, Achachino	Valles interandinos, Quechua, Suni y Altiplano

In Table 2, it is observed that from the cultivated quinoa, the leaves, tender stems, tender inflorescences, tender integrated plant, seeds and coloring extracted from the inflorescence after

Results and Discussion

As seen in Table 1, quinoa receives different names according to the areas where it is cultivated and languages spoken in the area, being this sympatric plant, because it is always accompanied by its wild relatives in the distribution and expansion areas of the crop [21], which both cultivated and wild ones are used in food and medicine, according to the different phenological phases in which they are found and using the different organs of the plant; however for ritual uses (Magic-religious), they are special plants because they have their own characteristics such as those of two colors, the most ancestral and colorful, dark or intense red, called Ispallas. Plants or parts of the plant used in medicine and for ritual purposes are obtained in the early morning before the sun rises and from special places such as the so-called Pirus areas (Sacred, dangerous), near the hills, lakes, rivers, slopes or rocks.

the threshing are used for feeding, this in the different phases phenological in which you get the greatest freshness, nutritional value, best taste, texture, color, smell and aroma, preparing

different dishes such as soups, creams, grained, background dishes, desserts, drinks, popeed based only from these parts or adding other ingredients, each receiving their own vernacular names with different nutritional chemical composition as well as daily use in the agroecological areas where these varieties are grown [22,23] and wild relatives widely distributed in crop areas, sacred and ruder areas; tender leaves and plants are mostly used in feeding and in some cases of drought emergency or adverse abiotic factors seeds, as also indicated by Tapia [24]. In the case of quinoa saponin, it is obtained after the removal of the saponin from the episperma of the grain, by washing or separating the shell by methods of light roasting to the heat and in the case of the dyes is obtained from the inflorescences that were already threshing or separated the grains, making aqueous extraction with boiled water and used to make drinks or dye food as a seasoning.

Table 3, shows that leaves, seed, saponin, ash and dyes are used in the prevention, healing and treatment of different ailments that are common in Andean settlers, due to the content

of active ingredients and molecules with powers widely known to Andean settlers, however there are people with knowledge of the protrusive and specialized healing power of the different parts of the quinoa plant who are referred to by different names according to the agro-ecological zone, language and considerations of the Andean inhabitants, due to the high cultural diversity existing in the Andes such as: Laykas, Altomisayuc, Yatiris, Colliris, Kallahuayas (traveling doctor), etc. Varieties selected for medicinal use have exceptional characteristics that are distinguished not only by their ancestral and wild appearance but by other characteristics typical of cultivars and wild relatives, they are generally of dark colors, intense red, deep yellows, with higher saponin content, higher amount of calcium oxalates in the leaves, which grow higher, in soils with higher salt content, soils with higher organic matter content, textured soils clay or silym, soils mainly from slopes where there is more solar radiation, etc., also indicated by [25]. In the case of ashes it is obtained from the roots that accumulate more mineral salts than other organs of the plant.

Table 3: Parts of the plant, wild relatives, phenological phase, common name and agroecological area of quinoa used as medicine by populations originating in the Andes.

Part of the Plant	Quinoa	Wild Relatives	Phenological Phase of Use	Common Name	Agroecological Zone
Leaves	X	X	Before flowering	Aara, Ayala, Paicco, Arka Paicco, Atacco,	Valles interandinos, Altiplano, Suni, Quechua
Seed	X	X	Physiological maturity	Ajara, Aara, Ayara, Ishualla, Mama, Machu, Raqac (quinua), etc.	Valles interandinos, Suni, Quechua, Altiplano, Cordillera.
Saponin	X	X	After of the desaponification	Posqqo, Kallku.	Altiplano, Suni, Cordillera
Ash	X	X	After harvest (from the root)	Usppa (To make Llipta o Llupta)	Valles interandinos, Altiplano, Suni y Cordillera
Coloring	X	X	After threshing (Grain less of the inflorescence)	Cuchiwila, Ayrampo, Kewa, Antahuara, Huariponcho	Valles interandinos, Quechua, Suni y Altiplano

In Table 4, it is observed that quinoa are not only used seeds in human food, but other parts of the plant such as leaves, inflorescences during different stages of their vegetative period, using the most suitable varieties for each type of preparation for its unique and exceptional characteristics that give it its components in these stadiums, which have been identified, preserved and used by the Andean cultures developed along the Andes mountain range to be able to take better advantage of these qualities, as well as the prepared dishes receive proper names of each locality or

region where they are consumed, using necessary complementary ingredients that give it flavor, aroma and exalt its palatability and freshness [26]. The way in which these foods are prepared are still unknown, by the urban and modern populations, which should be used to give it an appropriate use of these preparation techniques and especially by using the specific varieties to give it correct use and make better use of not only the nutritional qualities but also the healing ones.

Table 4: Parts of the quinoa plant used in food, variety, native name of food, characteristics and form of consumption in the Andes.

Part of Plant	Quinoa	Name of the Variety [27].	Native Name of the Food	Characteristic and Form of Consumption
Grain (seed)	X	Hacujiura	Acupito, Phiri, Quispiño	Toasted flour
				Wet Toasted flour
				Steamed small bread
Grain (seed)	X	Kcoyto	Quispiño Lawa	Steamed small bread Cream

Grain (seed)	X	Chullpi	Caldo Tacti Saltado	Offwhite soup Fried croquettes Mixed with potato
Grain (seed)	X	Kcancolla rosada	Chaqruscca	Cooked and mixed with vegetables
Grain (seed)	X	Ajara	Kispiño negro	Steamed small black bread
Grain (seed)	X	Huariponcho	Kispiño amarillo Lawa K'usa	Steamed bread with lime Yellow cream Refreshing drink
Grain (seed)	X	Jancco jiura	Viscochuelos Tajolas Tojto	Cakes Cookies Small cake
Grain (seed)	X	Jaru jiura	Chupes, Tacti, Pesque, Quispiño	Soups, juices Croquettes Cream Steamed small bread
Grain (seed)	X	Kello	Quispiño, Lawa, Tojto, K'usa.	Steamed small bread Cream Little fried bread Refreshing drink
Grain (seed)	X	Chullpi rosada	Jhancca	Popped or popors grain
Grain (seed)	X	Kcancolla blanca	Tacti	Fried biscuits
Grain (seed)	X	Pasankalla	Phisara	Grained quinoa
Grain (seed)	X	Antahuara	Phisara	Grained quinoa
Grain (seed)	X	Ajara	Katawi	Cream whith lime
Grain (seed)	X	Witulla	Paruja	Red quinoa flour with llama blood
Grain (seed)	X	Blanca july	Pesque	Cream with lime and cheese
Grain (seed)	X	Ajara negra	Kispiño	Steamed small bread
Grain (seed)	X	Ccoyto	Tacti	Leadcolored fried biscuits
Grain (seed)		Pasankalla	Chupe	Red soup
Grain (seed)	X	Kcoyto café	Ullpu	Drink with toasted quinoa flour.
Grain (seed)	X	Antahuara	Kaswira	Fried quinoa small bread with llama fat and Katahui
Grain (seed)	X	Real/ Toledo/Pandela	Muccu	Quinoa pastry stuffed with llama meat
Tender stem	X	Jiura blanca	Chiwa	Salad
Tender stem	X	Paicco rojo	Condimento	In soup and cream
Tender stem	X	Choqqa chiwa	Chiwa	Salad
Tender inflorescences	X	Pasankalla	Arrebosado	Empanized of panicle
Tender inflorescences	X	Ayrampo	Arrebosado	Empanized of red panicles
Inflorescences after threshing	X	Cuchiwila	K'usa, Chicha	Water of boiled red panicles

In general all native and cultivated varieties are used in human food, each native variety being exclusive for the preparation of dishes, having identified 28 forms of preparation in the original populations of the Andes, which are Table 4, with the identified varieties you get the right taste, color and texture; also the tender leaves and inflorescences until before flowering of all quinoa varieties and their wild relatives are used in the diet as leafy vegetables or inflorescence vegetables. The most common dishes in the daily diet of the Andean inhabitants are: Lawa, Pesque, Katawi, Quispiño, Paruja, Muccu, Tajola, Phisara, Chiwa, Jhaucha, Lipcha, Kusa, Ajja, Tacti, Piri, Jhancca, Tojto, etc.; among the most outstanding meals of the Andean inhabitants have been recovered 28, prepared with natural ingredients and typical of the localities where they are consumed, also many of them steamed avoiding as much as possible the degradation of their nutrients thermolabile for the effects of heat and making the most of their food and nutritional properties, therefore they are collected in the phenological phases that have the highest content of these nutrients; Pots and cooked clay dishes are used for this preparation, as well as wooden cooking instruments to prevent the loss of taste and aroma.

The ingredients used in the preparation are those available in the area, in some cases external flavorings or supplements are used. Currently there are more than 150 different forms of food preparation with quinoa, since with fusion cuisine, andean novo cuisine, gourmet cuisine, vegetarian and vegan cuisine, celiac cuisine, has increased its forms of preparation and presentation of dishes based on this andean grain [27]. Thirty-nine medicinal uses of quinoa have been found, which are shown in Table 5, which previously contrasted with chemical analyses and medicinal properties, were systematized and cards were made to be corroborated by the kamiris, Alta misayooc, laycas, yachaq, jampi runas (Andean people dedicated to the treatment of ailments and diseases, associated with the forms of preparation of nutraceutical foods)[25-28], among the medicinal uses of quinoa, Ancient Andean grain we have: For the treatment of bone fracture, sprains, dislocations, shocks and having strong bones (Since it contains more Ca than corn and rice and easy absorption), using quinoa Ayara and feeding with quinoa in different forms of preparation (Lawa, Presque, Phisara) [24].

Table 5: Parts of the plant used in the prevention, treatment and cure of ailments, name of the variety, diseases it cures, form of use as quinoa medicine in the Andes.

Part of the Plant	Quinoa	Wild Relatives	Name of the Variety	Diseases it Cure	Form of Use
Grain (seed)	X		Jaru jiura	Fractures, dislocations and twists	Ground with lizard, snake in poultice
Grain (seed)	X		Kello	Constipation	Boiled grain juice
Grain (seed)	X		Antahuara	External parasites	Water is used from the washed grains (saponin).
Grain (seed)	X		Kcancolla	Scalp cleaning	Warm water from washed grains (saponin) is used.
Grain (seed)	X	X	Ajara	TBC	Cooked grains and daily consumption
Grain (seed)	X		Huariponcho	Menopause	Consumption of grains cooked with lime.
Grain (seed)	X	X	Aara	Fracture exposed bones	Ground with chirichiri, lime urine is put to the wound.
Grain (seed)	X	X	Ishualla	Anemia, TBC	Daily consumption of cooked grains.
Grain (seed)	X	X	Mama jiura	Fortifying and Constipation	Ready to make a quispiño (small bread with lime)
Grain (seed)	X		Chullpi rosada	Galagtogetic	Prepared in soup and consumed in hot form
Grain (seed)	X		Kcancolla	hastening childbirth, uterine dilator	Drink hot quinoa soup to speed up childbirth
Grain (seed)	X	X	Machu quinua	Luxations and twists	Ground grains in poultice with other herbs.
Grain (seed)	X	X	Raqac quinua	Ear pain and inflammation	With burnt grains, the ears are saumaized (vaporized).
Grain (seed)	X	X	Mama quinua	Breast and uterine cancer	Consumed ground, cooked and boiled with lime
Grain (seed)	X	X	Ajara	Polyglobuling (excess red blood cells by height)	Take a glass of water that soaked the bitter grain (saponin).
Grain (seed)	X	X	Ajara negra	Stress, melancholy, grief	Consume black kispino after burial (high Li content)
Grain (seed)	X	X	Aara	Anemia and poor nutrition	Consume paruja (cooked quinoa with llama blood).

Grain (seed)	X		Chillpi	Altitude evil	Hot quinoa soup
Grain (seed)	X		Pasankalla	Improves memory and cognitive processes	Consume in different forms continuously and in childhood by flavonoids and Vitamin E.
Grain (seed)	X		Pisankalla	Promotes intestinal transit	Consumed in the form of lawa chancca (split grains)
Grain (seed)	X		Jiura blanca	Osteoporosis	Consume in katawi with lime by the high content of Ca associated with Mg.
Grain (seed)	X	X	Paicco rojo	Elimination of worms and gastrointestinal	Consume ground and dissolved grain in water (Ascaricide)
Grain (seed)	X		Kcoyto negra	Fortifies bones	Due to descalcification of bones
Grain (seed)	X	X	Arcca paicco	Removal of amoebas	Lightly toasted and ground grain take fasting.
Grain (seed)	X		Misa quinua	Regulates cholesterol	Consumed in phisara by the high content of dietary fiber
Grain (seed)	X		Quinua real	Energisante (gives energy)	Consumed in pito dissolved in water with coca leaves
Grain (seed)	X		Kcoyto negra	Combat constipation	High in fiber
Grain (seed)	X		Amarilla maranganí	Control type II Diabetes	Daily consumption maintains level of glycemia by having low glycemic index
Grain (seed)	X		Kcoyto	Slimming	Consumed in toast or phisara by high fiber and low carbohydrates
Grain (seed)	X		Kcoyto negra, Pasankalla, Antawara	Celiac food	Gluten-free in seeds and low in carbohydrates.
Grain (seed)	X		Blanca de july	Recovery of patients after convalescence	Consumed after the grain has germinated.
Leaves	X		Cheweca	Healing	Tender crushed leaves, placed as a slaty in wounds.
Leaves	X		Chullpi	Remove stains from the face and body	Mudding tender leaves and placing as a patch.
Leaves	X		Witulla	Lower the fever	Place previously crushed tender leaves on the forehead.
Leaves	X		Cuchiwila	Antiinflammatory	Tender crushed leaves deflate blows.
Leaves	X	X	Chocka chihua	Sunburn on the skin	Putting crushed leaves on the skin
Leaves and seed		X	Asna paicco	Eliminates flatulence and stomach pain	Rest leaves and seeds, take them in infusion
Inflorescence	X		Cuchiwila, Ayrampo, Huariponcho	Anti-Aging (Antioxidant by Betacyanin content)	Consume boiled panicles after threshing to extract dyes.
Ashs	X		Chiara Kcoyto	Mosquito repellent and moths	Ashes of burnt grains sprinkled or rubbed on the skin.

Avoid sadness, melancholy and stress, due to the content of Lithium, especially in black quinoas and wild relatives, consumed in the form of kispíño (black steamed bread), especially after the death of relatives and during the duel. It is galactogenic, increasing the milk secretion of pregnant mothers, prepared in soups adding fennel and consuming during the postpartum. Prevents problems of menopause by having phytoestrogens (Daidzein and cinestine) avoiding organic and functional alterations during menopause, caused by a lack of estrogen, having to consume katawi (quinoa cream with lime) on a daily basis. Prevents Osteoporosis from the high calcium content associated with magnesium, consumed in the form of soups, creams, grains). It contributes to the cure of TBC by the ideal balance of essential amino acids, high biological value, high lysine, shaping the cells, tissues and organs of the human

body, associated with the minerals and vitamins it contains. It regulates cholesterol levels by the high content of dietary fiber and unsaturated fatty acids (Oleic acid, linoleic and linolenic), because 6 % of the total weight of the grain is fiber, while favoring intestinal transit. It improves cognitive processes and memory by containing Flavonoids, Vitamin E and antioxidants (Betalains, betazhantins, necessary to preserve health), mainly in leaves and seeds. It is an energy source for muscles, brain and nervous system, containing alanine, has glycine that acts as a brain tranquilizing neurotransmitter, regulates motor and proline functions, participates in joint repair and heals lesions, this last are the leaves of wild relatives (*C. carnosolum* Moq.). It controls anemia and altitude sickness due to its high content of iron, associated with vitamin C and folic acid, generating high levels of hemoglobin and avoiding

the harmful effects of hypoxia due to lack of oxygen in height. The llipta (Ash of quinoa root mixed anise, sugar and salt, moistened in the form of buns) to counteract harmful effects of phytotoxins consumed in the Andean diet. Saponin, avoids polyglobulin, due to the hemolytic action, because in height people have to form more red blood cells to avoid hypoxia. Quinoa leaves are healing, have phenolic compounds (acid ferúlic, sympatric, gallic, kaempferol and rutin), with anticancer and antioxidant properties [22,28]. The ancestral andean grain quinoa, are also used in rituality to counteract teluric diseases and as biological indicators.

As shown in Table 6, quinoa has full use of the whole plant, for different purposes: food, medicinal, ritual, forage, seasoning, for cleaning and personal grooming, ornamental, insect and mosquito repellent, fuel, dye, biocide, depending on the varietal diversity used, phenological phase, form of consumption or preparation, therefore quinoa plays an important role in the populations originating in the Andes, constituting a highly appreciated plant, preserved and used by ancestral cultures andeans, whose genetic and cultural potential is still in the process of modern rediscovery, so modern

genetic improvement seeks parents with the most desired qualities to be able to incorporate them into the new varieties to be obtained by the hybridization [28]. Different parts of the plant, varieties, phenological phases of quinoa are used for use nutraceutical, medicinal and others (seeds, leaves, tender stems, tender plants, inflorescences, ash, dyes, saponin). Quinoa has medicinal uses and there is ancestral knowledge in the native peoples of the Andes about its nutraceutical properties; as well as the form of preparation in human food, dosage and way of use to better take advantage of its preventive, curative and disease treatment properties. 39 medicinal uses of quinoa have been identified to prevent, cure and treat various diseases and ailments even present in the original peoples and also in modern societies of the Andes. The phenological phase of using quinoa parts for food and as medicine are of great importance for such uses (Ramification, panting, flowering, milky grain, physiological maturity or full maturity) [29], for the maximum accumulation of nutrients, freshness, texture, increased presence of active ingredients, increased amount of vitamins, fiber, dyes, etc.

Table 6: Complete record of traditional uses of quinoa by peoples originating in the Andes.

Type of Uses	Number	Purpose	Agroecological Zone Of Use	Form of Use
Food	39	Proper nutrition and food	Valles interandinos, Valles costeros, Quechua, Suni, Altiplano, Cordillera y Yunga	Prepared in different dishes from entrees, salads, soups, background dishes, desserts and drinks.
Medicinal	28	Prevention, cure, treatment of diseases and ailments	Valles interandinos, Quechua, Suni, Altiplano, Cordillera.	Prepared with other ingredients to prevent, cure and treat different ailments.
Ritual	12	Ceremonies to the Pachamama (Mother earth) and magical-religious	Quechua, Suni, Altiplano.	Different magical-religious acts: thanks to the pachamama, marriage, christening, housing construction, animal marking, etc.
Forage	4	Green plant, sprouts, immature grains, perigonions.	Quechua, Suni, Altiplano.	Green forage, concentrate harvest remains and immature grains.
Seasoning	3	Wild relative leaves	Quechua, Suni, Altiplano.	Paicco (C. ambrosioides) Arka paicco (C. insisum), food coloring.
Cleaning and personal grooming	2	Saponin	Valles interandinos, Quechua, Suni, Altiplano.	Cleaning hair, washing white clothes and alpaca fiber.
Ornamental	3	Vivid colors and two-color panicles.	Valles interandinos, Quechua, Suni, Altiplano.	Misa quinua, Ayrampo, Cuchiwila, Antahuara.
Insect and mosquito repellent	3	Higher saponin content against moths, mosquitoes and weevils.	Quechua, Suni, Altiplano, Valles costeros.	Bitter varieties and wild relatives
Fuel	2	Like firewood	Suni, Altiplano	For having high caloric power, in the kitchen and ovens.
Coloring	3	Bright yellow or red panicles	Valles interandinos, Quechua, Suni y Altiplano.	For K'usa (drink called Chicha), meals and dye clothes.
Biocide	3	Ashes, seeds of wild relatives	Valles interandinos, Quechua, Suni y Altiplano.	Concentrating bitter seed saponin against aphids, trips and Eurisacca quinoae larvae

Members of the Andean community who know these uses are considered of higher hierarchy in Andean society, of complete vocation of service, people highly appreciated and respected, since they do not charge for the services they provide to the community, calling them Yatiris, Kamiris, Laykas, Altomisayoc, Yachac, etc. In the Andean worldview the best medicine is the adequate and varied food with natural products [30]. Plants or part of plants used for

medicinal purposes are collected before the sun rises, so that they are still serene (they have received cosmic rays from the moon, stars, and firmament). The Andean food in the native peoples of the Andes is sacred and therefore worships before sowing, harvesting or consuming. Ancient Andean grains are often used alongside other ingredients to enhance their nutraceutical value, as is the case of Paruja (quinoa mixed with llama blood, to prevent and control

anemia, or Katawi (quinoa with lime to have a make phytoestrogens available in order to prevent menopause discomfort). Wild relatives that are ancestors of quinoa, have enhanced the healing active substances, with better preventive and healing effects than of cultivated plants and are generally those of black, red, yellow or intense lead. It has systematized 28 native food uses prepared based on quinoa and thirty-nine diseases that prevents and counteracts, currently known more than 150 different forms of preparation. Adults of the peasant communities of the native peoples of the Andes, both men and women, are those who retain ancestral knowledge about nutraceutical use (Food, medicinal, curative) and ritual of quinoa and its wild relatives. The forms of preparation of meals, medicine and ritualities using quinoa are still maintained in the peasant communities of the indigenous peoples of the Andes, which are in the process of erosion, forgetfulness and loss by the introduction of drinks and food transformed with a lot of dissemination by the oral media, written through cell phones and televisions that arrive very easily towards children and young people from peasant communities.

The native varieties of quinoa have food and medicinal uses widespread in traditional therapeutics, of the peasant communities of the native peoples of the Andes with ancestral knowledge of cultivation, use, transformation and conservation diversity and variability In situ, through ancestral systems called Aynokas, Laymes, Mandas, Muyus, etc., which allow rational land use, pest and disease control, weeds and cultivated and wild diversity and variability [31]. Wild relatives of quinoa are widely used in traditional medicine because they have healing and preventive active ingredients of ailments and diseases much more enhanced than domesticated and cultivated varieties, which are preserved within the fields and in areas reserved and protected by communities, called Phirus or dangerous areas. Quinoa has been part of the diet of the Andean people since very remote times; however its cultivation has been losing importance due to the arrival of new species brought by Europeans and then by the abandonment of the Andean region by governments on duty and at the same time by economic policies that for people are increasingly resorting to the importation of foods other than those produced in the Andean region.

Black, lead, red, yellow, intense quinoas have higher nutritional and curative value, because they contain good quality protein, offering better and adequate possibilities for the preparation of different food products; also for medicinal uses because of the greater potential of healing active ingredients that they possess like the saponin [32], so the Andean villager preserves them In situ. The Andean ancestral grains are used in important ritual ceremonies in the native peoples of the Andes (Baptism, marriage, first haircut, house building, animal marking, etc.).

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