



Lupin Bioeconomy
Development

Is the Andean lupin bean the new quinoa?



**Andean lupin and its food and non-food
applications for the consumer**

www.libbio.net

Is tarwi the new quinoa?

New food: Andean lupin and its applications for the consumer, food and non-food

Introducing the Andean lupin bean

The Andean lupin, *Lupinus mutabilis*, is one of four lupin species suitable for human consumption. This lupin originates from South-America where it has been part of the menu for thousands of years. Like the soy bean, the Andean lupin bean is high in oil and proteins and has the potential to be a good alternative for many soy bean applications. The LIBBIO project aims to introduce the Andean lupin in Europe as a new crop for food and non-food applications. It has several great advantages: it grows in marginal soil, for example; it creates its own nitrogen fertilizer from the air by natural symbiosis with bacteria and, when harvested, has nutritious beans rich in proteins, vegetable oil and prebiotics. Andean lupin oil is rich in unsaturated fatty acids and high in antioxidants and Vitamin-E (tocopherol), thereby contributing to a healthy menu.



*Traditional Andean lupin cropping
Ecuador*



*Chefs from Lima visiting
Amsterdam*

A very special bean

All markets in the Andes region in Peru sell the Andean lupin bean, also known as tarwi, chocho, altramuz or pearl lupin. Andean lupin is the traditional food of the peasants. In Europe it is hardly known, which is rather surprising. There's no reason for it to be not just as popular as quinoa, which also originates from Peru, because tarwi is extraordinarily nutritious, contains very high levels of proteins and vitamins and is at least as, if not more, wholesome than soy. In Peru mothers like to feed it to their children, because they feel it's better than giving them a lot of meat. And children love it. They

love eating ‘chocho’ (a popular name for tarwi) as a snack, for example with cheese. There are even mothers who claim it makes their children smarter.

Preparation time

A group of chefs from Lima visited Amsterdam at the beginning of 2019, to talk about tarwi and their favourite recipes with this ingredient. The lupin bean does require some preparation, however. Where you can soak beans or lentils overnight, this doesn’t work for the lupin bean. Traditionally the women from Peru soaked the beans for up to eight days in running water, usually in a nearby river. This is necessary, because otherwise the bean would be too bitter and have a tough texture. One of the reasons this very healthy bean wasn’t eaten much was this long preparation time. In our modern, busy lives most people cannot spend so much time anymore in preparing a dish. Currently Peru and the Netherlands are working together on ways to develop methods to make tarwi easier to use and to prepare, so it can be sold in supermarkets. The idea is that preparation time would be no longer than that of, say, rice or beans. Like this, it would find its way to a larger number of people who could then enjoy the great benefits of tarwi.

Who should eat tarwi?

When you add tarwi to a dish, you cover 40% of your family’s calorie and protein requirements. In Peru mothers love giving it to their children, because they are in full growth and this helps them to develop well. It is also especially good for pregnant and breastfeeding women because of its protective qualities. But because of its great nutritional value, tarwi is really good for everyone.



Tarwi, sold locally at markets in Lima, Peru

Interviews with three chefs from Lima

‘I believe that tarwi made my children smarter!’

- Tatiana Luján, communication

Tatiana Luján now works in communication, but she used to own a small cafeteria in Lima. She has been eating tarwi ever since she was small. In her village they used to call tarwi ‘chocho’. Because it’s so nutritious and full of vitamins, she also gave it to her own children when they were small. And because she’s a good communicator, she told people who visited her cafeteria about the wonderful qualities of tarwi.

Tatiana: ‘Like quinoa, tarwi is very nutritious. I loved feeding it to my children, because I considered it to be healthier for them than a lot of meat. Little meat, lots of tarwi, was my motto. My children often asked me for spaghetti with chocho. They loved it. And I loved that they loved it. I believe it made them very intelligent, because later they went to a very high level American high school.

Her own favourite is boiled potato with a zesty sauce with tarwi instead of a biscuit to thicken the sauce. Because tarwi also works very well to bind sauces and other dishes.

‘After some experimentation I made the perfect tarwi bread’

- Tomás Bances, baker



Baker Tomás Bances

‘As a child I never ate tarwi, says baker Tomás Bances, ‘because I’m from the north of Peru and tarwi doesn’t grow there. I’ve been working as a baker for more than thirty years and recently I have started experimenting with other, healthier ingredients to make bread, so I baked bread with tarwi. This had everything to do with the gastronomical ‘boom’ Peru is currently experiencing. Local products are getting more attention, and so tarwi as well. It is a growing market and I can see clearly that it’s getting more and more popular. The other day I read that the average Peruvian eats more than fifteen kilos of tarwi a year. In Peru we have a culture of eating white bread and I wanted to help change this, because tarwi bread is much healthier. The first tarwi loaves I baked didn’t taste at all good, by the way. The flavour was too strong, and it

did not really work. After some experimentation I discovered that 25% tarwi is exactly the right amount. And since I found that balance, I really love eating tarwi bread myself as well!’

‘My tarwi tortillas are perfect to go with meat dishes’

- Juan Talledo, chef

Juan Talledo is a chef from Lima who specialises in meat dishes. ‘I use tarwi in the tortillas I serve with the meat. Prepared this way, with egg, my customers really love it. It is a staple food for many people in the Andes, but people who are new to tarwi really have to get used to it. It’s a bit of an acquired taste. Especially the shell can be bitter, so it is important to peel the bean. It took a while for people in cities such as Lima to start eating tarwi and like it, but these days there’s even a restaurant in Lima called El Tarwi. They prepare everything with tarwi there, such as guinea pig, for example. Clearly, tarwi is getting more and more important, even if it is still most popular with people who know it already. My own favourite dish with tarwi is solterito with fava beans, tomatoes, lemon, onion, salt, pepper, potato, corn and mixed vegetables.’



Juana Cuno, one of the cooks from Lima, prepares a dish with tarwi

Recipes with the Andean lupin bean (tarwi)¹

Solterito with tarwi

Starter for 3 people

Solterito is a starter, originally from the south of Peru, and always served cold. It's inexpensive and easy to make and you can use all kinds of store cupboard ingredients. There are as many versions of this dish as there are cooks who prepare it. Solterito means something like 'small single man'. Perhaps the dish was so named because the quantities can easily be adapted to suit one person and it is so very easy to make.

Ingredients

- 100 grams of tarwi beans, cooked in boiling salted water for 20 minutes. Strain and peel the beans.
- 100 grams of fava beans, cooked
- 1 potato, cooked and diced
- 100 grams of corn, cooked
- ½ red onion, diced
- 1 tomato, deseeded and cut into small pieces
- mixed vegetables of choice
- 100 grams of soft white cheese (such as feta) cut into cubes
- 3 tablespoons of lemon juice
- 3 tablespoons of olive oil
- salt and pepper
- 4 black olives, sliced
- 2 tablespoons of chopped parsley



Preparation

Put the tarwi beans into a large bowl. Add the fava beans, potato, onion, tomato, vegetables, corn and feta and mix. Season with lemon, olive oil, salt and pepper. Add the parsley and black olives and serve with bread (optional).

Solterito with tarwi

1. Recipes are inspired upon "Consuma Tarwi" Instituto nacional de nutricion, Proyecto lupino Lima -Peru, 1980

Torrejas of tarwi with cubio

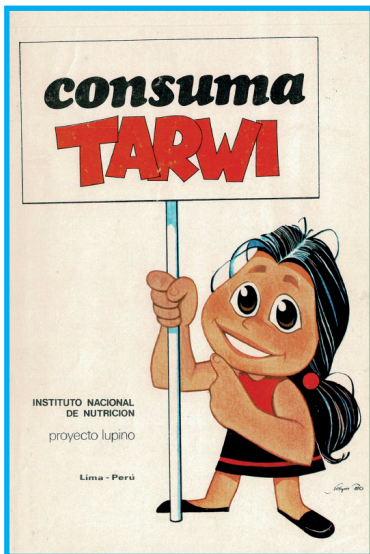
This recipe includes cubio (oca), which is sometimes used as an alternative to potato. It is a vegetable which grows in the Andes, because it can be cultivated on poor soil at great altitudes. This healthy and colourful tuber has been gaining greater popularity over the past few years and it combines well with tarwi.

Ingredients

- peeled wheat
- fresh tarwi
- 1 chopped onion
- 1 egg
- 1 tomato, chopped
- parsley, chopped
- ground garlic
- salt
- oil
- cubio (oxalis tuberosa)

Preparation

Season the wheat in a pot with enough water, when cooked, remove from heat and strain. Peel the fresh tarwi, and grind or liquidate. Finely chop the onion, tomato and parsley. In a bowl, beat the egg well and season with salt and ground garlic. Add the chopped vegetables, the ground tarwi and the cooked wheat to the beaten egg. Mix well and fry in hot oil, making 4 to 5 turrets. You can serve them with cubios.



Tarwi recipe book, 1980



Torrejas

Quinoa soup with tarwi

Ingredients

- fresh tarwi, peeled
- quinoa
- 2 potatoes, chopped into cubes
- 1 onion, chopped
- 1 stick of celery, chopped
- 1 leek, chopped
- 1 carrot, chopped
- 1 tablespoon of ground coriander
- oil
- salt and pepper
- water or broth

Preparation

Make the dressing with the oil, chopped onion, ground coriander, salt, pepper and the rest of the vegetables chopped into cubes. Once the dressing is golden, add enough broth or water.

Bring to a boil. When it boils, add the washed quinoa and the peeled tarwi and let it boil until the quinoa is well cooked. Finally, add the potatoes cut into fine cubes. Stir until the soup has thickened lightly and serve.



Chef Juana Cuno from Lima at work in the kitchen

Ceviche serrao con cancha

Ceviche (cebiche) is Peru's ultimate contribution to world cuisine. Usually this is a seafood dish, typically made from fresh raw fish cured in citrus juices, such as lemon or lime, and spiced with ají, chili peppers or other seasonings. This recipe however, is for a vegetarian cebiche.

Ingredients

- fresh tarwi
- green peas
- onion
- Chinese onion
- rocoto (a type of chili pepper)
- lemon
- lettuce
- coriander
- parsley
- sweet potato
- cancha (roasted corn with frying oil)

Preparation

Peel the tarwi. Parboil the green peas in water with a bit of salt. Chop the onion, the “rocoto” and the parsley. Mix it all and season with salt, lemon juice and pepper. Serve garnished with lettuce and accompanied by sweet potato and “cancha”.



Ceviche

LIBBIO project

LIBBIO project

LIBBIO is a European research project on the Andean Lupin (*Lupinus mutabilis*, tarwi): *Lupinus mutabilis* for Increased Biomass from marginal lands and value for BIOrefineries www.libbio. Lupin has the ability to fix nitrogen, mobilise soil phosphate and has low nutritional requirements for cultivation. Varieties will be chosen that give a high yield of green silage or a high yield of seeds which contain 20% oil and more than 40% protein. The remaining materials are carbohydrates, mainly oligosaccharides which can be characterized as “prebiotics”.

Andean Lupin can be grown as a summer crop in N-central Europe and as a winter crop in Mediterranean conditions. Pre-industrial processing has been developed and optimized for the lupin, properties of the different fractions analysed, their advantage for different industrial use evaluated, and a few products have been developed as an example. Social and environmental impact will be evaluated as well as techno-economic viability and the effects on farm and bio-refinery income. The project started on the 1st of October 2016 and is expected to finish on the 30th of September 2020. The estimated project cost is 5 million euros..

Composition lupin seeds compared with other major protein-oil crops								
		White lupin	Bleu lupin	Yellow lupin	Andean lupin	Soy bean	Sunflower	Rapeseed
Moisture	g /100 g fw	8.6	9.0	9.4	8.1	8.54	4.73	9.4
Metabolic energy	kJ/ 100 g dw	2078	2032	2164	2307	2040	2565	1920
Crude protein	g/100 g dw	38.2	33.9	42.2	43.3	39.9	21.8	20
Crude lipids	g/100 g dw	11.2	6.3	5.5	18.9	21.8	54.0	46
Fiber	g/100 g dw	8.9	16.0	15.8	8.2	10.2	9.0	
Ash	g/100 g dw	3.4	3.0	3.8	3.9	5.3	2.8	
Carbohydrates	g/100 g dw	39.3	41.0	38.8	32.9	33.0	21.0	

Table of crude compositions of different protein and oil crops

Food and cosmetics

The LIBBIO project develops new Andean lupin bean food and cosmetic applications. The Andean lupin bean has three major components: vegetable oil, protein and soluble fibre (prebiotic oligosaccharides). From these nutritious products can be developed. Andean lupin has to be given a novel food allowance (see Novel food). Before this has been granted, it is not allowed to consume Andean lupin or its food products in the EU. All recipes in this booklet can be made from other lupins allowed in the EU. The white and blue lupins are best suited for human consumption.

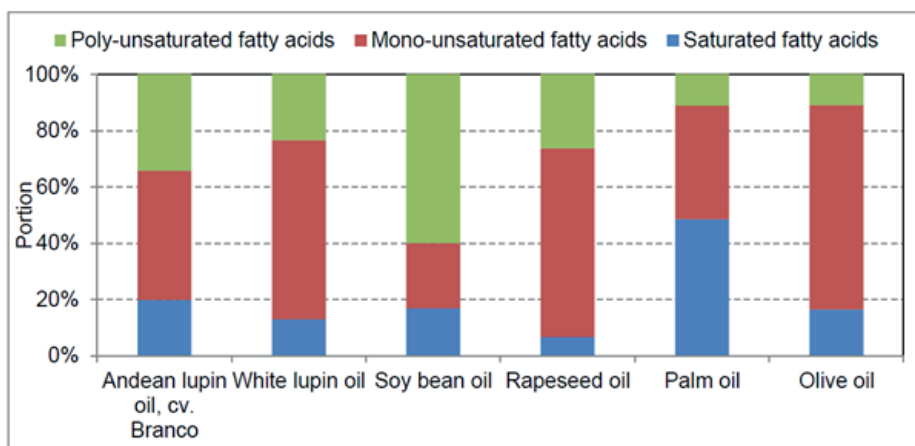


Novel Food

When Christopher Columbus discovered South-America he brought back potatoes as one of the “golden treasures” that changed the world. Potatoes are now globally staple crops after corn (maize), rice and wheat. Columbus forgot to take the white beans, tarwi, which were grown next to the potatoes in the Andean farmer’s fields, to Europe as well. And that is a real pity. When we want to introduce Andean lupin into the European menu now, we have to ask for a novel food allowance. “Novel food” refers to food that European citizens have not consumed to a significant degree prior to May 1997. Since there is substantial consumption of the Andean lupin in South America as a traditional food, we intend to apply for the allowance through the ‘traditional food’ procedure. Examples of other traditional foods from South America are chia (not eaten before 1997), quinoa (eaten before 1997) and amaranth (eaten before 1997). It is likely that Andean lupin must be evaluated, like the chia seed, by the European Food and Safety Authority (EFSA), before it is considered safe for human consumption. Until that time it is not allowed to bring Andean lupin or its products as food products on to the European market.

https://ec.europa.eu/food/safety/novel_food_en

Note: All recipes in this booklet can be made from other lupins allowed in the EU. The white and blue lupins are best suited for human consumption



Food applications

The LIBBIO project develops prototype food products with Andean lupin oils and proteins. Andean lupin oil has a high tocopherol content, which is a natural anti-oxidant which prevents oils from becoming rancid. Andean lupin oil applications such as mayonnaise, dressings, margarines and cacao spread benefit from these anti-oxidants by having an increased shelf life. Andean lupin oils are rich in unsaturated fatty acids, and so contribute to a healthy diet. Product prototypes with Andean lupin proteins are, for example, vegan ‘milk’, vegan ‘yoghurt’ and vegan ‘milk-chocolate’. These products are made from Andean lupin concentrates or Andean lupin protein isolates.



Vegan lupin yoghurt



Vegan lupin chocolate spread

Cosmetic applications

Andean lupin ingredients can be part of cosmetic products for skin and hair care and for colour cosmetics. The brand ZoiY® is partner of the LIBBIO project and develops new prototype products with lupins and Andean lupin. Andean lupin oil is a precious ingredient for lipsticks and lip-gloss, because of its high anti-oxidant content. Andean lupin oil gives additional smoothness and spreadability to lipsticks and lip-gloss. Andean lupin oil gives extra gloss and shine to hair when added to shampoos and conditioners.



ZoiY® product range with lupin ingredients: hand cream, day cream night cream and cleansing lotion www.zoiy.eu

Andean lupin proteins and peptides are subjects in research for their anti-aging and hair-strengthening properties. It is expected, based on scientific reports, that Andean lupin proteins and peptides may have anti-aging and skin barrier protection functionality. Research conducted in the LIBBIO project will substantiate these indications. Research will also look into the effects of lupin protein and peptides on hair-repair when hair is weak, dry, or brittle. The first treatment tests with 2-1 shampoo/conditioner are promising and show increased softness and ease of untangling and combing. ZoiY® natural cosmetics formulates prototype skin care creams and prototype 2-1 shampoos as part of the LIBBIO project.



Lupin proteins and peptides for anti-aging skin care cream



Lipstick with lupin oil



Lupin protein and peptides for strong and glossy hair

LIBBIO applications

The LIBBIO project demonstrates feasibility of applying a completely new protein and oil crop for Europe, with benefits for the environment, farmers, industries and consumers. Products with added value that meet consumer needs and environmental requirements are being developed as prototypes in this project. Eventually these will contribute to a circular biobased economy in the EU.

Partners

LIBBIO: *Lupinus mutabilis* for Increasing Biomass from marginal lands and value for BIOrefineries

LIBBIO Project: 2016-2020; Leadpartner: Pall Arnason, Nyskopunarmidstod, Island; Project partner: Netherlands: Hanze hogeschool Groningen, Wageningen University, Louis Bolk Instituut, Color & Brain BV, Vandijk Semo BV; Iceland: Landgræðska Ríkisins; Germany: Deutsches Institut für Lebensmitteltechnik; Austria: Bio-Institut der HBLFA Raumberg-Gumpenstein; Spain: Agencia Estatal Consejo Superior de Investigaciones Científicas; Portugal: Instituto Superior de Agronomia, Lusosem - Produtos para Agricultura; Greece: Agricultural University of Athens; Romania: Universitatea de Stiinte Agricole si Medicina Veterinara Ion Ionescu de la Brad

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Colophon

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