

## Quinoa: A Nutrient Dense Pseudocereal with Many Benefits

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Rice and wheat are the first grains that come to mind when thinking about nutritious grains. However, another ancient, resilient, and incredibly nutritious grain has started to appear in Indian kitchens: quinoa. Quinoa, or *Chenopodium quinoa* Willd., was first cultivated as a staple by the indigenous people of Bolivia, Peru, Ecuador, and Chile more than 5,000 years ago in the Andean mountains of South America. Because of its resilience, it helped people survive in harsh weather conditions, such as parched, rocky soil and frigid mountains. In 2013, the Food and Agriculture Organisation, in collaboration with the international community, proclaimed 2013 to be the "International Year of Quinoa," honouring its agricultural and nutritional potential. This milestone sparked curiosity across the globe, and gradually, quinoa started to find its way into Indian farms and diets. As India struggles with malnutrition, micronutrient deficiencies, and an increase in lifestyle illnesses, quinoa is an innovative, cutting-edge crop that provides much more than just calories.



### The composition of nutrients

#### Balanced Macronutrients: Fibre, Carbs, Protein, and Good Fats

- The protein content of quinoa seeds ranges from 12.5% to 16.7%. That is far more than the majority of staple grains. Quinoa provides all essential amino acids, thus this protein is also of excellent quality. Quinoa is therefore regarded as a "complete protein," making it particularly suitable for vegetarian diets. [ICAR]
- 60–74% of the grain is made up of carbohydrates. However, these are mostly the complex carbs that digest slowly and contribute to stable energy rather than blood sugar spikes. [ICAR]
- Depending on the kind and processing, the dietary fibre content varies from 1.9% to roughly 10.5%. Fibre promotes gut health, facilitates digestion, and helps control blood sugar and cholesterol. [ICAR]
- The overall fat content ranges from 5.5% to 8.5%. In contrast to most grains, quinoa's lipids are rich in heart-healthy unsaturated fats.

Quinoa has a significant nutritional advantage over many staple foods because of its balanced composition of macronutrients, including protein, fibre, complex carbohydrates, and healthy fats.

**Bioactive compounds:** Quinoa includes beneficial phytochemicals that act as antioxidants in addition to traditional vitamins and minerals, adding a functional-food dimension beyond

nutrition. All of this turns quinoa into a nutrient-dense diet that provides concentrated nutrients in little portions, rather than just a "filler grain."

### Key Micronutrients in Quinoa

According to various studies and the publications from ICAR affiliates, the major micronutrients present in quinoa grains are:

**Minerals:** Quinoa grains are rich in important minerals, particularly when compared to more conventional grains like wheat or rice.

Iron is a heavy metal that is necessary for the body to produce oxygen.

Magnesium: Involved in numerous physiological functions, including metabolism and bone health.

Phosphorus: Essential for maintaining various tissues and bones.

One significant mineral that is frequently found in large quantities in the grain's outer layers is potassium.

Zinc: It participates in numerous chemical reactions and is vital for immune system function and overall health.

For metabolism and heart health, respectively, manganese and copper are extremely important trace elements.

**Vitamins:** Quinoa contains fat-soluble antioxidants including vitamin E as well as water-soluble B vitamins.

B vitamins: Quinoa is a good source of several B vitamins, including riboflavin (B2), pyridoxine (B6), and folate (B9), all of which are critical for cell function and metabolism.

Vitamin E is a fat-soluble antioxidant that helps prevent a number of illnesses.

### Nutrition Comparison: Quinoa vs Selected Cereals (Dry Weight, per 100 g)

Nutrient (100 g dry)	Quinoa	Maize (Corn)	Rice (White)	Wheat
Energy (kcal)	399	408	372	392
Protein (g)	16.5	10.2	7.6	14.3
Fat (g)	6.3	4.7	2.2	2.3
Carbohydrates (g)	69.0	81.1	80.4	78.4
Iron (mg)	13.2	2.1	0.7	3.8
Zinc (mg)	4.4	2.9	0.6	4.7
Calcium (mg)	47	7	11	29
Magnesium (mg)	197	127	23	126
Thiamin (B1, mg)	0.36	0.39	0.18	0.39
Riboflavin (B2, mg)	0.32	0.20	0.06	0.11
Niacin (B3, mg)	1.52	3.63	2.15	4.38
Folate (µg)	184.0	0.0	7.0	38.0

### From Seed to Table: Processing Matters

Even while uncooked quinoa seeds are nutrient-dense, Indian researchers stress that other methods, such as soaking or germination, could enhance nutritional advantages and reduce some unwanted compounds. According to a 2024 study by Patibula et al. from Bengaluru, soaking and germination of quinoa seeds increases nutrient bioavailability, vitamin C levels, and digestibility in germinated quinoa while reducing anti-nutritional factors like saponins, phytic acid, tannins, and oxalates—substances that may block mineral absorption or give a bitter taste. Anuhya and Dobhal (2024) carried out an additional investigation on the effects of germination on the functional properties of quinoa, including water absorption, oil absorption, and emulsifying properties. The findings showed that germinated quinoa flour was more adaptable for use in porridges, baked goods, health mixes, and even infant feeds. To put it another way, a little soaking and sprouting turns quinoa into a more nutrient-dense, easily digested, and useful grain—a helpful adaptation for Indian kitchens and eating habits.



## Importance of Quinoa for India

Quinoa's nutritional value and adaptability help address a number of India's dietary issues: **Deficiency in protein and amino acids:** The majority of Indians rely on low-quality proteins from cereals. Quinoa provides a plant-based complete protein, which is beneficial for women, children, and vegetarians.

A high mineral content of quinoa is used to treat micronutrient deficiencies, such as iron-deficiency anaemia, calcium deficiency, and mineral shortages.

**Digestive health and metabolic disorders:** Quinoa's low glycaemic load, fibre, complex carbohydrates, and healthy fats make it ideal for diabetics and to support gut health. **Food security and dietary diversity:** Quinoa is a "climate-resilient" food alternative since it grows well on even marginal soils and saline or dry lands. In fact, under Indian conditions, ICAR states that cultivars such as Him Shakti (quinoa) contain approximately 15.56% protein and 9.26% oil. [ICAR]

Quinoa's functional dietary potential appears to highlight additional advantages beyond its basic nutritional content, such as immunity support, anti-inflammation, and overall health. Observe that the corresponding properties of summation can be used to show all of the aforementioned integral properties.

Quinoa appears as a vital addition to our food basket in a nation dealing with hunger, micronutrient deficiencies, and diseases associated with contemporary lifestyles.

## Conclusion: Quinoa — A Grain for the Future

It is an ancient grain that finds its significance in the present day via scientific confirmation, nutritional completeness, and agricultural diversity, not just some imported "superfood." In the Indian setting, quinoa provides a powerful combination of necessary micronutrients, healthy fats, dietary fibre, high-quality protein, and bioactive compounds—all packaged in a grain that can grow under difficult conditions. In addition to improving food and nutritional security, adopting quinoa sensibly and using the right cooking and processing methods—such as soaking and germination, for example—would significantly improve health and enhance diets. Quinoa is a robust crop for farmers as well. In summary, quinoa might be a game-changer for India's nutrition, not simply a passing trend but a long-term, healthy staple for future generations.