



## Removal of Saponin in Quinoa

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Quinoa (*Chenopodium quinoa* Willd) is a pseudo cereal which belongs the same species as spinach and Amanranthus. Its origin lies in pacific slope of Andes region in south america and it has great importance and considered as sacred garin in Inca Civilisation but lost its grace during spanish colonisation . It has variety of local names but commonly called as Quinoa in Bolivia, Chile and Peru. It is also called as Golden grain because of its high resistance to drough, chill and saline conditions and ability to cope up with high temperature.

Even though it consists of cereal type characteristics such as the presence of panicle-type inflorescence , it doesn't belong to Gramineae family , it is called as pseudo cereal. Quinoa has a higher protein concentration and a more equal distribution of key amino acids than cereals, and its biological value is similar to that of milk protein. In terms of lipids, proteins, dietary fibres, vitamins B1, B2, B6, C, and E, and minerals, particularly calcium, phosphorus, iron, and zinc, it outperforms cereals. When compared to typical cereals like rice, maize, barley, and wheat, it has greater amounts of total protein, methionine, and lysine, as well as fatty acids similar to those found in soybean oil in its lipid makeup. Quinoa is a great example of a "functional food" that can assist to lower the risk of a variety of ailments. Its functional characteristics might be linked to the inclusion of fibre, minerals, vitamins, fatty acids, antioxidants, and plant hormones, which all contribute to human nutrition, particularly in the preservation of cell membranes, and have been shown to promote brain function. These characteristics provide grains a significant edge over other plant foods in terms of human nutrition and health maintenance.

Inspite having exceptional nutritional value compared to cerela garains the major draw back for consumption of quinoa is the presence of the anti nutritiona factors such as saponins and tannins. , phytic acid, oxalates, tannins, and trypsin inhibitors. These substances are present in higher concentrations in the outer layers of the grain, among which saponin stands out gives the characteristic bitter taste of Quinoa. These anti nutritional factors interfere with digestibility, absorption, or utilization of nutrients, possibly causing harmful effects on health if ingested in high concentrations and reduce the nutritional value of foods.

### Saponins

The major component of saponins is Triterpenoid glycosides which are found in plants, mainly in the Leguminosae family. Quinoa contains saponins in outer layers of the grain (episperm), which protects it from birds and insects as a part of natural defense mechanisam. Only Quinoa and Oats exhibit exceptonal quantities of saponins and more resistant to insects. The sweet varities of quinoa are less bitter because they contain less amounts of saponins. Saponins contain amphiphilic properties and they are soluble in both polar and non poalr solvents (Estrella D.S, 2018) .

Saponins can cause hemolysis of red blood cell based on its saponin type. The effect s are highly observed in animal studies , little effect in is observed in huma studies. The nutritional absorption of Iron and Zince is evident with saponin consumption.



The primary saponin discovered in the leaves was hederagenin, whereas oleanolic acid was detected in the seeds. The pericarp contains more saponins, accounting for 86 percent of the total saponins in the grain, indicating that peeling can remove the majority of this component. In comparison to soybeans and other legumes, the level of saponins in quinoa grain is substantially lower. Because of its bitter taste, the amount of this material in the pericarp of the grain is frequently decreased or eliminated to improve sensory quality and customer acceptance. Wet procedures (strong washing in cold alkaline water), dry methods (heat treatment, extrusion, roasting, or mechanical abrasion), or a mix of both methods are used to remove the material. The wet method can be employed at both house hold and commercial levels with careful monitoring. Mechanical abrasion can result on loss of nutrients, Wet method with polishing is most appropriate to reduce or minimise the nutrient loss (A.M.M Filho *et al*, 2017).

## References

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