

PSEUDO-CEREALS: A RESERVOIR OF ESSENTIAL NUTRIENTS

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INTRODUCTION

Cereals provide a large section of sources of carbohydrates in form of rice, wheat and other starches. Now-a-days, with ever-growing population along with advancement of research in the field of nutrition and food science, people's choice of food are shifting towards many new sources of food. Pseudo-cereals are one of those new food sources that are coming into limelight gradually. Pseudo-cereals are the starchy seeds, serving as food material obtained from dicotyledonous plants. The name adapted as pseudo-cereals because these seeds though being used in a same way like the cereal grains belong to dicotyledonous family instead on being monocotyledonous like the cereals are.

TYPES OF PSEUDO-CEREALS

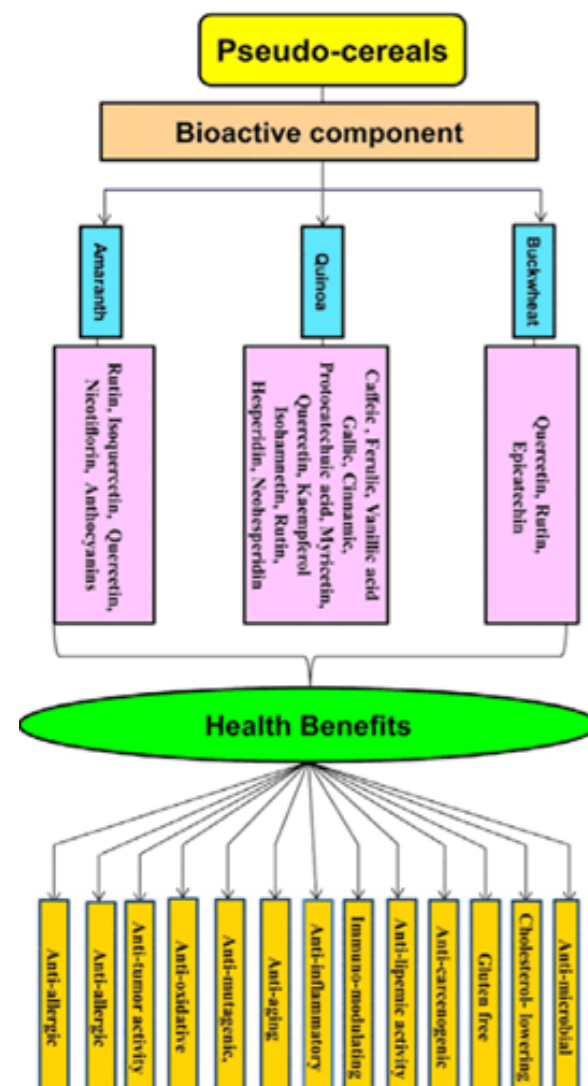
Unlike the cereals, pseudo-cereals are not the members of Grass family, i.e, Gramineae. The most common example of pseudo-cereals are amaranth, quinoa, buckwheat, chia, acorn, breadnut, canahua, cockscomb, pitseed goosefoot and wattleseed. These are highly nutritious, rich in carbohydrates, protein, vitamins and minerals. Different plant species of *Amaranthus* e.g. *A. cruentus* L., *A. caudatus* L. and *A. hypochondriacus* L. have been grown for grains for more than 8000 years, mainly in Mexico and other parts of USA. These species are highly adaptive showing resistance to changes in pH, temperature, salt content and other environmental factors. Buckwheat (*F. esculentum*, *F. tataricum*) mainly cultivated as a food source in Russia, China, Japan, Brazil and other parts of Asia. It is different from wheat. Chia (*Salvia hispanica*) is another pseudo-cereal of Family Lamiaceae, grown in southern Mexico, Guatemala, South America. Breadnut or ramon (*Brosimum alicastrum*), a plant of Moraceae family is cultivated in Mexico, Colombia, Jalisco and Haitian. Canahua (*Chenopodium pallidicaule*) and



quinoa (*Chenopodium quinoa*) are native to Bolivia and Peru of South America. Celosia that is known as cockscomb, velvet flower, rooster comb, quail grass and soko is used as food source in India, Mexico, West Indies and Indonesia. Acorn or oaknut is the nut of Oak tree and other related species of Fagaceae family is used as staple food by people of Korea and America. *Chenopodium berlandieri* commonly known as pitseed goosefoot, lamb's quarters of family Amaranthaceae is widespread in North America, Canada and Mexico. Wattleseeds are edible seed from any species of Australian Acacia i.e. *Acacia murrayana* and *Acacia victoriae* used as traditional food by the people of Australia.

NUTRITIONAL BENEFITS

Pseudo-cereals are rich in carbohydrates, proteins, dietary fibre, vitamins, minerals and other phytochemicals. Amaranth seeds are rich in starch, proteins, amino acid lysine, calcium, phosphorous, manganese, vitamin B6 and folate. Nutritionally it is superior to wheat grains. It can be used in preparation of snacks, tortilla, atole, candy (Algeria in Mexico) and breakfast items. Buckwheat contains high proportion of protein, fibre manganese, magnesium, phosphorous, fibre, niacin. Salicylaldehyde is responsible for the characteristic aroma of buckwheat. It contains phytochemicals like rutin, catechin, tannin etc. Gluten free beverages e.g. beer, whisky and sochu (Japanese) are prepared from buckwheat through fermentation. Tea prepared from buckwheat is consumed by people in China, Korea and Japan. Chia seeds are rich in dietary fibre and other vitamins and minerals. The high content of Omega-3-fatty acids present in chia seeds is helpful for cardiac patients. It has positive effects on brain development and cooling effect in body. Breadnut contains more amount of dietary fibre, calcium, potassium, iron, zinc phosphorous and B complex vitamins that possess protective action against infections. It is high in antioxidants and contains low GI carbohydrates useful for diabetic persons. Roasting of breadnut gives flavour of chocolate and coffee. Breadnut flour is used in preparation of hot beverages and bread. Quinoa seeds are rich in protein, fibre, calcium, zinc, iron, iron, unsaturated fatty acids especially mono unsaturated fatty acid, folate and other B



complex vitamins. Chenopodium seeds contain higher amount of protein, carbohydrate, magnesium, calcium, iron, flavonoids, linoleic acid, oleic acid, linolenic acid. It is rich in antioxidants like quercetin and kaempferol that help in free radical scavenging activity. Tryptophan, lysine and other essential amino acids. These seeds are used as food preservative and effective in anti-helminthic treatment. Acorn contains more amount of protein, vitamin A, MUFA, niacin, copper, calcium, magnesium, potassium and soluble fibre. Wattleseeds are rich in carbohydrates of low glycaemic index, hence beneficial for patients suffering from hyperglycaemia. These seeds are rich in protein, fibre, iron, calcium, zinc, potassium, magnesium, vitamin B complex, A and K. It can be used in preparing chocolate, coffee, ice-cream, granola, bread, sauces and dairy desserts. Most of the pseudo-cereals are gluten free, hence these are very much useful for people having gluten sensitive enteropathy. Starches prepared from quinoa, Chenopodium, amaranth, buckwheat are used to prepare gluten free snacks and bakery products.

PROCESSING TECHNIQUES

Though pseudo-cereals are rich in nutrients and phytochemicals, they contain certain anti-nutritional factors such as oxalate, saponins, phytates that inhibit the utilization and absorption of iron, calcium and other minerals. Hence, certain processing techniques are followed before consuming them. Soaking, fermentation, popping, germination, boiling etc. are the processes that is helpful for reducing the inhibitory activity of these anti-nutrients.



CONCLUSION

Pseudo cereals possess great potential to be utilized for preparation of value added gluten free products. Beside their gluten free characteristics, these are rich in high quality protein, dietary fibre, essential amino acids and fatty acids and minerals such as iron and calcium. Various bioactive chemicals such as polyphenols, phytosterols with health-promoting effects are present in abundance in pseudo-cereals. Processing treatments such as soaking, germination, popping, cooking and fermentation have been found to increase the nutritive value of these grains. These should be commercialized as the availability of these products in the market is quite inadequate.