JUST AGRICULTURE
multidisciplinary e-Newsletter

Buckwheat, It's Health Benefits and Uses

Skarma Choton*, Dr Julie D Bandral and Dr Monika Sood
Department of Food Science and Technology,
Sher-e-Kashmir University of Agricultural Science and Technology, Jammu, J&K

ARTICLE ID: 023

Ladakh particularly known as Cold Arid Region in Northern most of India comprised of the Kargil and Leh districts with short growing period extended from April to August (Ali *et al.* 2018). It is known for many functional crops such as buckwheat, barley, sea buckthorn, apricot, walnut, turnip, pea, etc. Buckwheat (*Fagopyrum esculentum*) is a pseudo cereal, belongs to the family *Polygonaceae*, one of the major traditional, underexploited crop having good nutritional value, can be grown in poor agroclimatic regions and requires low inputs for its cultivation (Verma, 2018). Buckwheat locally known as *dyat, dro, bro, fafar*, etc is grown traditionally in relatively warmer areas of both Leh and Kargil districts of Ladakh, where double-cropping is possible (Figure 1). It is generally grown as the second crop after harvesting the barley crop. There are two variants of buckwheat grown in Kargil: yellow-coloured, small-sized brosuk and black-coloured, larger-sized gyamrus (Ahmad and Raj, 2012). But now buckwheat despite being staple foods are underutilized because of the less knowledge of their functional properties among the locals, preferences of younger generation for new food under the ages of modernization and availability of new crops like rice on subsidized rates under PDS, etc (Hussain, 2020).

Nutritional composition of Buckwheat

Buckwheat is a nutrient dense, gluten-free plant source with abundant health benefits owing to the higher presence of various bioactive components of buckwheat, such as

JUST AGRICULTURE
multidisciplinary e-Newsletter

flavonoids, polyphenols, polysaccharides, saponins, proteins, fatty acids, and trace elements. Due to the presence of bioactive compounds, buckwheat has engrossed the attention of researchers owing to its healing and functional food properties (Ge and Wang, 2020).

The main consumption buckwheat form is seed. It is a rich source of starch and contains many valuable compounds, such as proteins, antioxidative substances, trace elements and dietary fibre. Whole buckwheat groats contain 55% starch, 12% protein, 4% lipid, 2% soluble carbohydrates, 7% total dietary fibre, 2% ash and 18% other components (organic acids, phenolic compounds, tannins, phosphorilated sugars, nucleotides and nucleic acids and unknown compounds). The protein content in buckwheat flour is less only than oat flour, but significantly higher than those in rice, wheat, millet, sorghum and maize. Buckwheat also contains rare elements such as K, Mg, P, Fe, Ca, Cu, Zn, Se, Ba and B, I, Pt, Co. Commercial light-coloured flour mostly comprising from central endosperm contains 75% starch, 6% proteins, 1% lipids, 1% soluble carbohydrates, 3% total dietary fibre, 1% ash and 13% other components. Bran with little central endosperm contains 18% starch, 36% protein, 11% lipids, 6% soluble carbohydrates, 15% total dietary fibre, 7% ash and 7% other components. Buckwheat bran is a rich source of total dietary fibre and soluble dietary fibre, particularly bran with hull fragments (40% of which 25% is soluble dietary fibre), while bran without hull fragments has 16% total dietary fibre of which 75% is soluble dietary fibre (Krkošková and Mrazova, 2005). Vitamin content of common buckwheat groats are presented in Table 1.

Table 1. Vitamin composition of common buckwheat

Vitamins	Level (mg/g)
A(β-Carotene)	2.1
B1(Thiamine)	4.6
B2(Riboflavin)	1.4
B3(Niacin)	18.0
B5(Pantothenic Acid)	10.5
B6(Pyridoxine)	7.3
C(Ascorbic Acid)	50.0
E(Tocopherol)	54.6

(Source: Wijngaard and Arendt, 2006)

JUST AGRICULTURE
multidisciplinary e-Newsletter

The nutritional functions of essential minerals in buckwheat and foods prepared from it have been studied by many scientists and concluded that buckwheat seeds are a good source of many essential minerals Table 2.

Table 2. Mineral concentrations (mg/g) in buckwheat and milling fractions

Mineral	Whole Groats	Flour	Bran
Potassium	5·6500	5·0030	14·1630
Phosphorus	4·9000	4·1670	13·5330
Magnesium	2·6760	2·5300	5·9910
Calcium	0·1970	0·3000	0·3330
Iron	0·0303	0·0340	0·0604
Zinc	0·0292	0·0283	0·0726
Manganese	0·0164	0·0180	0·0462
Boron	0·0067	0·0066	0·0241
Copper	0·0071	0·0070	0·0104

(Source: Keda *et al.* 2006)

The primary antioxidants in buckwheat are rutin, quercetin and hyperin. Buckwheat bran and hulls have 2–7 times higher antioxidant activity than barley, triticale and oats (Ahmed *et al.* 2014).

Health Benefits of Buckwheat

Due to the presence of bioactive compounds, buckwheat has engrossed the attention of researchers owing to its healing and functional food properties. It has significantly proven to be anti-oxidative, anti-cancer, hepatoprotective, anti-hypertension, anti-tumor, anti-inflammatory, anti-diabetic, neuro-protection, cholesterol-lowering, and so on (Nazir *et al.*, 2021). Another functional property of buckwheat is its gluten-free characteristics which make it promising diet for patients suffering from celiac disease (Hussain and Kaul, 2018).

Buckwheat Uses

The flour of buckwheat is used in the preparation of breads for breakfast, in pancakes, and porridges in most of the areas of Ladakh region. A popular food item made of buckwheat flour in Kargil is known as kiseer or giziri, which is similar to plain dosa. Buckwheat flour is mixed with wheat and barley flour to produce nodules and biscuits. The whole grains of buckwheat (*F. tartaricum*, *F. sagittatum*) when poped and soften are highly platable and are

JUST AGRICULTURE
multidisciplinary e-Newsletter

as good as those prepared from the corn or other millets. Also leaves and young shoots are boiled and eaten as spinach (*F. dibotrys*) in lower areas of the region. In Ladakh, the grains of buckwheat is often recommended in the restricted diet of patients suffering from lung diseases, liver ailments, fluxes and all kinds of abdominal obstruction. In several remote areas of Ladakh people prepare a dye from hulls of buckwheat (*F. sagittataum, F. tataricum, F. esculentum, F. kashmirianum*) and use it in textile fabrics. In some areas of Drass and Zanskar the people used the hulls of buckwheat in finishing the printed fabrics (Munshi, 2001). Buckwheat is also used for livestock and poultry as forage and feed, (Ahmad *et al.*, 2019)**.**

Conclusion

Thus buckwheat is an important crop with good nutritional as well as functional properties. It is a rich source of valuable compounds, such as proteins, antioxidative substances, trace elements and dietary fibres. It is gluten-free, anti-oxidative, anti-cancer, anti-tumor, anti-diabetic, cholesterol-lowering. Keeping in view these benefits increase in consumption of buckwheat and its products is strongly recommended as food. Further development of new products from buckwheat can expand their utililization and economy of locals.

References

Ahmad, F. and Raj, A. 2012. Buckwheat: a legacy on the verge of extinction in Ladakh. *Current Science*, **103**(1):13.

Ahmad, M., Ahmad, F., Zaffar, G., Dar, E.A., Qayoum, S., Wani, A., Lone, A.A., Iqbal, S. and Majid, A. 2019. Buckwheat (Fagopyrum esculentum)-nutritive and health promoting crop of tribal people: strategies for revival in the face of extinction in Ladakh. *SKUAST Journal of Research*, **21**(2): 115-127.

Ahmed, A. , Khalid, N. , Ahmad, A. , Abbasi, A. N. , Latif, Z. S. M. and Randhawa, A. M. 2014. Phytochemicals and biofunctional properties of buckwheat: a review. *Journal of Agricultural Science*, **152**: 349–369.

Ali, M., Mehdi, M., Lakdan, S., Dolkar, T., Stanzen, L., Singh, P. and Hussain, S. 2018. Status of area and production of apricot (Prunus armeniaca L.) in cold arid Ladakh. *Journal of Pharmacognosy and Phytochemistry*, ***7***(2): 593-595.

Ge, R.H. and Wang, H. 2020. Nutrient components and bioactive compounds in tartary buckwheat bran and flour as affected by thermal processing. *International Journal of Food Properties*, **23**(1): 127-137.

Hussain, A. 2020. Characterization and Storage Studies of Instant Multigrain Porridge Made from Underutilised Crops of Ladakh. *International Journal of Food and Fermentation Technology*, **10**(2):119-127.

Hussain, A. and Kaul, R. 2018. Formulation and characterization of buckwheat-barley supplemented multigrain biscuits. *Current Research in Nutrition and Food Science*, **6**(3): 873-881**.**

Keda, S., Yamashita, Y., Tomura, K. & Kreft, I. 2006. Nutritional comparison in mineral characteristics between buckwheat and cereals. *Fagopyrum* **23**: 61–65.

Krkošková, B. and Mrazova, Z. 2005. Prophylactic components of buckwheat. *Food Research International*, **38**(5): 561-568.

Munshi, A.H. 2001. Ethnobotany of Fagopyrum in Kashmir Himalaya. The proceeding of the 8th ISB:687-689. Department of Botany, University of Kashmir, Srinagar-190006, Kashmir, India.

Nazir, M., Mahajan, R., Hashim, M.J., Iqbal, J., Alyemeni, M.N., Ganai, B.A. and Zargar, S.M. 2021. Deciphering allelic variability and population structure in buckwheat: An analogy between the efficiency of ISSR and SSR markers. *Saudi Journal of Biological Sciences*, 1-7.

Verma, K.C. 2018. Biochemical constituents of buckwheat (Fagopyrum esculentum Moench) collected from different geographical regions of Himachal Pradesh. *Molecular biology reports*, **45**(6): 2681-2687.

Wijngaard, H. H. and Arendt, E. K. 2006. Buckwheat. *Cereal Chemistry* **83**: 391–401.