

# Potential uses

## of buckwheat for human and livestock

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*The sustainable development goal of zero hunger requires the intensification of farming systems, but if any sort of long-term food security is to be realized, issues like the availability of nourishing foods would require increasing attention. Buckwheat controls weed growth because of its deep roots and quick leaf development. It is necessary to include more climate-resilient and nutrient-dense crops in agricultural and livestock portfolios. Due to its medicinal and nutritional qualities, buckwheat (*Fagopyrum esculentum*) has drawn significant interest from the scientific community worldwide. It serves as a helpful cover crop for preserving agricultural ecosystems. Buckwheat is a significant crop with nutraceutical benefits due to its gluten-free status, nutritionally balanced amino acid composition of its grain protein, and high quantities of antioxidants like rutin.*

**Keywords:** Break crop, Fagopyrin, Phosphorus-pump, Pseudo-cereal, Rutin, Smother crop

**B**UCKWHEAT (*Fagopyrum esculentum*) is an annual pseudo-cereal melliferous crop of the family Polygonaceae. Buckwheat has shorter, bushier stalks than most other cereals. Typically, ordinary buckwheat (*F. esculentum*) and tartary buckwheat are the two varieties utilized worldwide (*F. tataricum*). While tartary buckwheat is grown in mountainous areas, common buckwheat is widely grown and consumed.

Buckwheat can be produced as a secondary crop in many areas after the late summer harvest of major cereal crops like wheat or barley because of its quick vegetative growth till maturity. There is a shifting of the production of animal feed to other resources as the use of major arable crops for this purpose is increasingly constrained by environmental concerns. In this case, using buckwheat as a secondary crop could be a useful strategy for avoiding direct feed-food competition and feeding cattle and poultry.

Additionally, growing buckwheat



Flowering in buckwheat plant



Buckwheat plant

Source: [https://kvk.icar.gov.in/API/Content/PPupload/k0034\\_2.pdf](https://kvk.icar.gov.in/API/Content/PPupload/k0034_2.pdf)

has certain positive ecological effects. It could also facilitate several effects that are crucial given the current ecological pressure on crop production systems, including (1) reducing feed-food competition for arable land; (2) increasing biological diversity in crop rotations and improving soil fertility; and (3) providing an essential late-summer and fall nutrient source for insects,

preserving faunal biodiversity.

Buckwheat's high concentrations of Mg, Zn, K, P, Cu, and other nutritionally significant minerals, together with Selenium (Se), are further traits of a high-value animal feed. The very high amounts of tocopherols and rutin are both strong antioxidants that may support animal health and product quality.

### Buckwheat as a soil productivity restoring crop

Buckwheat serves a wide range of purposes, including those of a break crop, a green manure crop, a smother crop, a nutrient-conserving crop, a guard crop, and a cover crop. The ideal time for green manuring is early flowering or late vegetative stage. Buckwheat green manure increases the stability of the soil aggregates and scavenges nutrients, particularly calcium (Ca) and phosphorus (P). Buckwheat has high C:N ratio (34), which prevents nitrogen (N) from dissolving during decomposition and lowers the amount of N available in the soil. Additionally, buckwheat can reduce insect-pest cycles and root diseases.

### Buckwheat as a natural phosphorus pump

Buckwheat is regarded as a natural phosphorus (P) pump because of its exceptional capacity to scavenge P, Ca and some minor nutrients from the soil. Buckwheat roots have a large capacity to store inorganic phosphorus. Because of this, when buckwheat plants are added to the soil they decompose quickly, releasing P and other nutrients for the subsequent crop. The buckwheat plant may take phosphorus from organic sources and make it available to succeeding harvests through the exudates of its roots, which contain several mild acids, including phosphatases. Additionally, slow-release organic fertilizers like rock phosphate are mineralized by these acids and made available to plants.

### Buckwheat for sustaining livelihood security of hill regions

Despite being a crop with several uses, buckwheat is mostly farmed in India for its grains. However, leafy vegetables can also be made from young shoots and leaves. The husk is used to stuff pillows, while both the seed and the alcoholic beverages are made from the seed. The flour is used to make chapattis, pancakes, biscuits and noodles among other foods from the grain, which are typically consumed as human food. On the mainland, buckwheat is a common food during religious fast

days. Following threshing, the straw is fed to cattle while it is still green or fresh. Honey made from buckwheat flowers is of high quality and can be grown for a crop.

### Benefits for humans

**Bodybuilding/protective/quality food:** Buckwheat's economic significance is mostly attributable to the high nutritional content of its grains and the presence of rutin in the foliage. In comparison to most cereals, buckwheat grain typically has roughly 10–14% more protein. Due to the high content of the majority of necessary amino acids particularly lysine, threonine, tryptophan, and the sulfur-containing amino acids with about 80% digestibility, its protein is also of higher quality than that of cereals. Buckwheat flour, which has no gluten is used to treat celiac disease in people. The high quality slowly digested starch found in buckwheat grains aids in the treatment of diabetes. It also contains a good proportion of high quality fat. Palmitic, oleic and linolenic acids constitute about 95% of the total fatty acids in buckwheat grains. Buckwheat grain is very rich in trace elements like Zn, Cu, Mn and Se as compared to cereal crops.

**Medicinal plant:** Salicaldehyde (2-hydroxybenzaldehyde) is primarily responsible for the extremely pleasant scent of buckwheat grains. The rutin (quercetin-3-rutinosid) component of buckwheat is used to control high blood pressure, prevent hemorrhagic illnesses, and treat edema. Buckwheat leaves contain 3–6% of its dry weight. The majority of it is found in the buckwheat plant's blossoms and greenery. It also has strong anti-carcinogen characteristics. It is used to treat increased capillary fragility with concomitant hypertension, which causes hemorrhagic purpura and renal hemorrhage. Additionally, buckwheat has a lot of Cu, which helps the body use Fe and prevents hypohemia in people. Buckwheat is used by farmers in North East Asia to treat cattle with foot and mouth disease.

**Nutritional properties of buckwheat seeds:** Buckwheat seeds have 20–25 mg/g of fat, 100–125 mg/g of protein, 650–750 mg/g of starch, and 20–25 mg/g of minerals per serving. Only slightly less than oat flour, buckwheat flour has a greater protein level than rice, wheat, millet, sorghum, and maize flour. Along with having high quality proteins, buckwheat is also a rich source of numerous uncommon compounds that can treat some chronic ailments. The thiamin-binding proteins contained in buckwheat seed and the flavones, flavonoids, phytosterols, and fagopyrins among them are the most alluring. It also contains elements like Fe, Ca, P, Cu, Zn, and B, I, Pt, Co. The hulls and outer layers of the seeds have rather high concentrations of these minerals.

**Processing buckwheat for tea:** Buckwheat in tea can affect the bio-active components of buckwheat. Before being freed from their hulls, raw entire seeds are first steeped in water, then steamed, and then dried. To make the tea, the dehulled groats are roasted.



Buckwheat seed

### Benefits for livestock

**Ruminant species:** Buckwheat can be used as whole grain, shelled kernel, or the entire plant for ruminant feed, and it can be fed either fresh or preserved. In steep areas, sheep are used to graze buckwheat stubbles. Dairy cows produced more milk when fed newly harvested entire buckwheat plants (at 70% of the total dietary dry matter). Additionally, it increased

the efficiency of protein conversion from feed to milk as well as ruminal protein use. Feeding dairy cows crushed grains with hulls of common buckwheat at a rate of 94 g/kg dry matter of the whole meal, partially substituted commercial energy concentrate made of wheat. Methane production can be reduced as one of its potential moderating effects on human fermentation. Buckwheat silage, which is fed to animals, enhanced the milk's rennet coagulation characteristics a sign of how well it will produce cheese.

**Poultry:** Buckwheat seems particularly ideal as a feed component for chickens due to its high nutritional density. Although it is primarily a source of carbohydrates, the protein portion is especially important for poultry nutrition due to the fairly high methionine concentration. A meal with 40% dry matter of whole grain or shelled buckwheat results in equivalent performance and noticeably heavier eggs from layers. Additionally, it might strengthen the eggs' shells. The nutritious content of poultry products, including eggs and meat, is improved by dietary buckwheat.

#### Prospects and potential of buckwheat in India

Although buckwheat is a crop that is underutilized and neglected, both growers and consumers can benefit from its many advantages. It can grow in poor, marginal soils and even in the presence of environmental stress because it is

a climate-resilient crop. Buckwheat is thought to have a good diversity in the Indian Himalayan region, hence missions targeted at collecting this diverse and underutilized germplasm are needed. Buckwheat germplasm collections are also in need of rigorous classification and documentation for use in the future. Buckwheat has a fairly brief growing season and thrives in habitats with high hills that receive rain. Buckwheat is a promising crop for programs of sustainable intensification and diversification. Buckwheat is a crucial source of protein for tribal farmers who live in isolated hilly areas with little access to transportation because of its high quality protein that is balanced with amino acids. Its grain is rich in dietary fiber, lipids, minerals, and vitamins, including P, E, and B complex, as well as rutin and fagopyrin, both of which have many therapeutic benefits. Therefore, buckwheat is a type of superfood for Indian hill farmers. It should therefore be a staple crop in mountain agriculture's agricultural production systems to preserve the nutritional standards of small and marginal farmers.

By storing water and reducing soil erosion, it serves as a helpful cover crop for preserving agricultural ecosystems. Therefore, to achieve regional nutritional self-sufficiency for the rural population, this crop could become a crucial part of the agriculture system. Buckwheat is a short-lived multifunctional crop that adapts well to different multiple

cropping systems and can survive a variety of biotic and abiotic stresses. Its grain can be a very good source of nutritional carbohydrates, proteins, vitamins, and micronutrients. Therefore, it can serve as a very beneficial nutritional supplement for women and children.

#### SUMMARY

Buckwheat, a pseudo-cereal crop is a climate-resilient crop and can withstand both biotic and abiotic stress to a high extent as compared to commonly grown cereal crops. This crop has many benefits for humans as well as animals because of its high quality nutritional properties and is also soil restorative, controls weeds and breaks the chain of insect pest and diseases. This crop is having medicinal property also along with good quality carbohydrates, vitamins and multi-nutrients essential for the functioning of the body. Although this crop is generally neglected and is grown in some Himalayan states, it has vast potential to overcome food scarcity and high quality protein. This crop can reduce food-feed competition for arable land and increase biological diversity in crop rotations and improve soil fertility. So keeping in view the potential benefits of this crop for both humans and livestock, this may be grown to overcome the challenges of food and feed in the changing climate scenario of abiotic and biotic stress.

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#### Know Krishi Unnati Yojana

The *Krishi Unnati Yojana*, a central sector scheme, is envisaged as umbrella programme for focusing on food security, by merging schemes on Soil-health Card, Integrated Scheme on Agricultural Co-operation and Agricultural Marketing, National Mission on Agriculture Extension, Horticulture Development, Price Stabilization Fund, National Mission on Sustainable Agriculture and other programmes.

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This *Yojana* brings

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- Inputs from MoWR and DOLR received.
- Increase in agricultural production and productivity and enhance farm income.