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REVIEW ARTICLE

Common Buckwheat: A Neglected Plant with Great Health Benefits

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ABSTRACT

Background: Sustainable food security is dependent upon finding and improving food crops. Buckwheat (*Fagopyrum esculentum* Moench) has been neglected but is regaining popularity due to its short duration and low input for growing. Its flour has characteristics closely related to bread wheat.
Objectives: This extension article aims to review the specific nutritional and health features of buckwheat grain for the benefit of public health
Methodology: The information included in this article was gathered from different literature resources, including Google Scholar, Scopus, Web of Science, Springer Link, ResearchGate, Taylor & Francis, and related databases.
Results: The buckwheat is a short-duration crop compared to bread wheat. Its grain is used as a nutritional and functional food as it is rich in essential nutrients, dietary fibres, and vitamins. It is a pseudocereal and gluten-free crop. It has a low glycaemic index and has the insulin-sensitizing agent, D-Chiro-Inositol, which regulates blood plasma glucose level. It is also used in the treatment of polycystic ovary syndrome. However, despite all these benefits, our consistent food habits are a major deterrent to its adoption.
Conclusion: Buckwheat has numerous nutraceutical and health benefits. It remained a neglected crop due to non-adaptability of the crop and farmers perspective, but it is gaining popularity due to increased awareness of the people.

INTRODUCTION

Food security and nutrition form the foundation of human life, serving as essential pillars that not only sustain health and well-being but also catalyse progress in multiple developmental domains, including environmental sustainability, education, economic growth, and employment opportunities, thereby ensuring a resilient and prosperous society. The world population is steadily increasing, and with this growth, food insecurity is becoming a more pressing concern. According to the UN Population Division (2024), the global population may reach up to 16 billion by 2100, which will significantly increase food demand and put additional pressure on already limited food resources. Therefore, it is crucial to explore, diversify, and cultivate alternative food crops. Out of approximately 80,000 edible plant species, only 150 are actively cultivated, and just a few of these crop's supply around 84% of our caloric intake. Many crops have been neglected or lost due to monoculture and the green revolution. Among these neglected crops, common buckwheat (*Fagopyrum esculentum* Moench) stands out for its high nutritional and medicinal value. (Babu *et al.* 2021. In Pakistan, the buckwheat is known by local names Bro, Baroo, Baravo, Balti, Khowar, Satho, etc. It is grown at a limited scale in the inner valleys of the Himalaya, Hindukush, and the Korakaram mountain ranges. The major area of its cultivation in Pakistan is Gilgit-Baltistan, but its production is on a limited scale. However, due to increasing awareness about its health benefits, the area under buckwheat cultivation is increasing in the plains of Punjab. Adaptability trials have revealed that buckwheat has a great potential for growing in diverse environments in the relatively cool season (Luitel *et al*. 2021). Its average grain

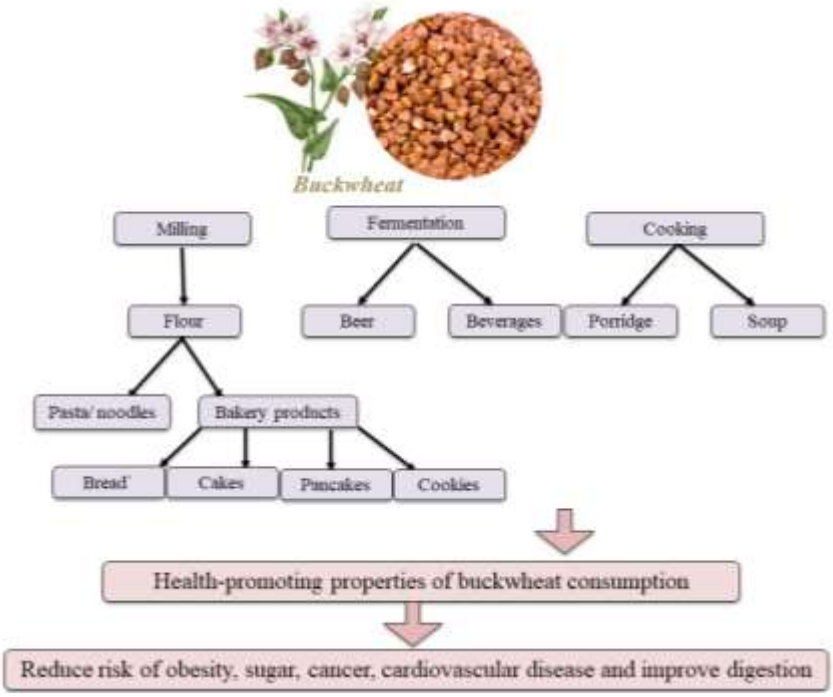

Fig. 1: Buckwheat and end-use products

yield goes up to 2 tons/ha under ordinary field conditions, but under well-managed conditions, it may yield up to 3 tons/ ha (Unal *et al*. 2017). Buckwheat is a pseudocereal of immense economic and nutritional value for people who follow a controlled diet. It has 70–75% carbohydrates, 12–15% proteins, and 3–4% lipids and 1.5–2.0% ash content, indicating high nutrient content together with several medically important bioactive compounds (Fujimura *et al*. 2003; Sofi *et al*. 2022). An excellent dough quality of buckwheat flour makes it a preferred choice for food-conscious people (Collar and Angioloni 2014). This review gives an updated overview of the medicinal and nutraceutical importance of buckwheat.

BUCKWHEAT SPECIES DESCRIPTION

There are two main types of buckwheat: common buckwheat (sweet) and Tartary buckwheat (bitter). Generally, consumers prefer common buckwheat due to its better palatability, whereas Tartary buckwheat is less favoured. Common buckwheat is a pseudocereal and is utilized similarly to wheat. The term "buckwheat" is derived from “buck,” reflecting the triangular shape of its seeds, which resemble the larger seeds of the beech tree, and “wheat,” indicating its use analogous to wheat (Luitel *et al*. 2021).

Buckwheat is native to Asia and is naturally distributed in Central Asia, including China and the Himalayan regions of Pakistan and India. Despite limited attention, common buckwheat is cultivated in countries such as Japan, China, Russia, Ukraine, and Kazakhstan. In Pakistan, it is grown in northern regions including Gilgit, Ghizer, Skardu, Hushe, Hunza-Nagar, and Kande along the Indus River. Locally, buckwheat is known by various names depending on the region and language, such as Baravo/Broofy in Gilgit, Baroo/Bali in Hunza-Nagar, and Jawas in Baltistan (Ahmed *et al*. 2014).

BIOCHEMICAL COMPOSITION

As shown in Fig. 1, buckwheat grains contain 60–70% carbohydrates, which are biochemically similar to cereal starch. The starch granules are also a potential source of nutrients, including carbohydrates, proteins, and lipids, as well as bioactive compounds such as trypsin inhibitors (Wang *et al.* 2007), antitumor proteins (Guo *et al.* 2010), hypotensive peptides (Zhu 2021), and antidiabetic peptides (Koç *et al*. 2025).

HEALTH BENEFITS OF BUCKWHEAT

Regarding health benefits and nutraceutical importance, buckwheat is considered a functional food. Ancient Chinese wisdom states, “people who love buckwheat live long” and “people who love buckwheat are healthy.” The seeds of common buckwheat resemble wheat in appearance and taste but are gluten-free, making them suitable for individuals with celiac disease or gluten sensitivity (Yurtseven *et al*. 2015). Buckwheat is a rich source of dietary fibre, providing

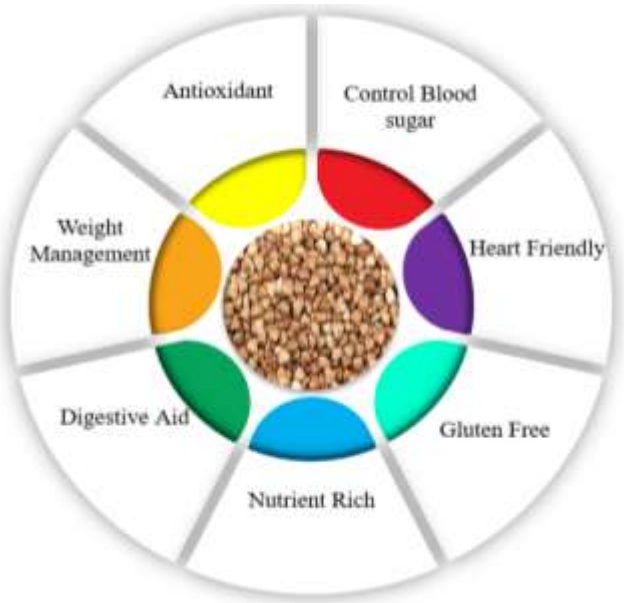

Fig. 2: Overview of buckwheat health benefits

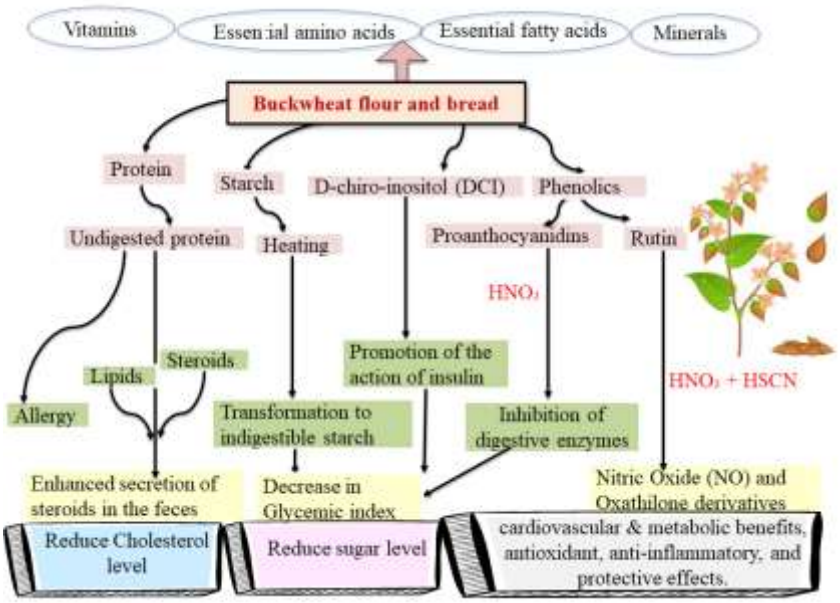

Fig. 3: Buckwheat nutrients and health benefits

approximately 6 g per cup, with coarse-grain flour containing ten times more fibre than refined flour. Its low glycaemic index allows carbohydrates to be absorbed gradually, and it contains the insulin-sensitizing agent D-chiro-inositol, contributing to improved blood glucose regulation. Consequently, buckwheat is beneficial for patients with diabetes, metabolic disorders, and polycystic ovary syndrome. Additionally, its high dietary fiber content and low glycemic index support weight management (Guo *et al*. 2025). Protein malnutrition is a major concern in developing countries, causing conditions such as poor growth, marasmus, and kwashiorkor in children, and reduced work efficiency in adults. Common buckwheat provides a valuable source of high-quality protein (13–21%), containing all essential amino acids, a rare attribute among crops. It also exhibits hypotensive effects and supports mental health; for instance, tryptophan in buckwheat contributes to positive mood, happiness, and

depression prevention. Buckwheat is rich in minerals, including magnesium, iron, phosphorus, manganese, and copper, as well as vitamins, which collectively improve cardiovascular function, reduce low-density lipoprotein cholesterol, control blood pressure, enhance circulation, prevent heart disease, and increase high-density lipoprotein cholesterol (Fig 2). Consumption of whole-grain buckwheat has also been associated with a roughly 50% reduction in asthma risk, likely due to its magnesium and vitamin content (Fujimura *et al*. 2003; Sofi *et al*. 2022; Koç *et al*. 2025). Furthermore, common buckwheat contains potent antioxidants, particularly flavonoids such as rutin, which are effective in managing low hemoglobin, cold, and flu. Skin health is influenced not only by genetics but also by environmental factors, including pollution, stress, and lifestyle.

Nutrient-rich buckwheat contributes to skin health by preventing premature aging, promoting skin firmness, and offering natural sun protection. Vitamins C (particularly in sprouts/microgreens), B, and E improve blood vessel function, circulation, and skin radiance. Hair health is also supported by nutrients abundant in buckwheat, including zinc, omega-3 and -6 fatty acids, and vitamins A, B6, and E, which can mitigate hair loss, thinning, split ends, and dandruff. Collectively, these properties position buckwheat as a highly valuable functional food and nutraceutical (Liţoiu *et al*. 2024; Bani *et al*. 2024; Koç *et al*. 2025). Although buckwheat is cultivated only on a limited scale in Pakistan, it is used in traditional local dishes such as Prapoo, Marzaan, Bro-skating, and Kisir, which are prepared from buckwheat flour. However, entrenched dietary habits limit the wider adoption of buckwheat. Gradual incorporation into daily meals is recommended to fully benefit from its health-promoting properties.

CONCLUSIONS

Common buckwheat is an extremely valuable pseudocereal with essential nutritional, medical, and biochemical features. It contains carbohydrates, high-quality proteins with all the necessary amino acids, dietary fibre, lipids, vitamins, and minerals, that's makes it a wonderful food for human health. Buckwheat is gluten-free by nature and possesses a low glycaemic index, making it a beneficial food for patients with coeliac disease, diabetes, and other metabolic disorders. Its bioactive constituents, such as rutin, trypsin inhibitors, hypotensive and antidiabetic peptides, are responsible for cardiovascular health, mental health, and disease prevention. Furthermore, antioxidants in buckwheat promote skin health, retard aging, and enhance hair quality. Though it has advantages, buckwheat farming and consumption are limited in most parts of the world because of the conventional food culture. Encouraging its productivity and incorporation into normal diets may enhance food security. Further studies are required to investigate its phytochemical constituents and underlying genetic basis.

AUTHOR CONTRIBUTIONS

All authors contributed equally to the conception, design, and preparation of this manuscript.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

DATA AVAILABILITY

The data will be made available upon request to the author

ETHICS APPROVAL

Not applicable

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