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A TREASURE OF NUTRITION AND HEALTH BENEFITS OF BLACK SOYBEAN: A REVIEW

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ABSTRACT

Black Soybean (*Glycine max* (L.) Merr.) has a wide array of pharmacological activities. Due to its medicinal properties it is extensively used as medicine in traditional medicine system. Even though its specific medicinal benefit has been found recently it is widely used as day to day food and also as drug since centuries. Recent research carried out for other uses like hypocholesterolemia, anti-carcinogenic, osteoporosis, cardiovascular, menopausal symptoms, kidney diseases, Antidiabetic and Antioxidant. The plant soybean is an important source of various types of compounds with diverse chemical constituents as well as pharmacological activities. Investigations conducted on black soybean have found presence of antioxidant compound of which anthocyanins is the main compound and it is found in their seed coat. It is found in abundance in the layer called epidermis palisade of black soybean seed coat. The three foremost anthocyanins found in black soybean seed coats are petunidin-3-glucoside, cyanidin-3-glucoside, and delphinidin-3-glucoside. Reports have suggested the health enhancing properties of anthocyanins like antioxidant effects (for anti-ageing), reduced risk of regulation of adhesion molecules, coronary heart disease, and safety from reperfusion heart injury and ischemia.

Keywords **:** Black soybean (kala bhatt), Nutritional value, Traditional and Medicinal value,

Introduction

In hilly area various common pulses like gahat, bhatt, sonta, rajma etc is consumed extensively due to their taste and nutritional values. Black soybean also known as kalabhat, bhatmaas or bhatt is an all-time favourite among native of Uttarakhand. People usually consume Black soybean in the form of Dal (bhatwani), a staple food in the area. It is usually cooked in an iron utensil (kadhai) to make thatwan, chudkani and bhatwani. Black soybean is rich in iron, phosphorus, protein and calcium, vitamins A and B and carbohydrate. The compound anthocyanins found in black soybean seed coat is known to have anti-obesity effect (Kwon *et al.*, 2007). Earlier reports have indicated that by various treatments nutritional quality of legume can be changed to increase its nutrient utilization efficiency (Mubarak, 2005; Sharma *et al.*, 2011; Odiba, 2011). Some of processing techniques like soaking and germination, roasting, pressure cooking; boiling is believed to decrease the antinutrients to a significant level (Dsouza, 2013; Adegbehingbe, 2014). In the developing countries research attention is being paid to better consumption of legumes in addressing food security issues and protein malnutrition. There is a lack of information, unlike many other legumes, on effect of processing of black soybean on proximate composition. This review paper is an attempt to study the nutritional components and other compounds found in black soybean and their health promoting effect on human.

Taxonomy

Scientific name: *Glycine max* (L.) Merr.

Kingdom	:	Plantae
Phylum	:	Magnoliophyta
Class	:	Magnoliopsida
Order	:	Fabales
Family	:	Fabaceae
Subfamily	:	Faboideae
Genus	:	*Glycine*
Species	:	*G. max*

Colloquial Name in India: Bhat, Bhatman, Bhatmash, Ramkulthi, Kalitur, Kala hulga

Origin and Distribution

It is said that soybean was first brought to India from China by traders of Indonesia. At present India is the 5th major producer of soybean after USA, Brazil, Argentina, and China. In India it is cultivated in East Bengal, Uttarakhand, Khashi Hills and in small part of central India specially Madhya Pradesh. In Uttarakhand black soybean is grown in Garhwal and Kumaon region along with bordering area of Uttarakhand state (Shah *et al.,* 2006).

Habitat

Soybean is considered to be first grown in South East Asia. But now a day, it is generally produced in USA, Argentina, Brazil, China and India. In India it is cultivated as

pulse crop in Uttar Pradesh, Haryana, Himanchal Pradesh, Gujarat, Manipur, Kashmir, Naga Hills (Kanchana *et al.,* 2016).

Health benefits of soybean (Sugano *et al.,* 2006)

- Hypertension.
- Hypercholesterolemia.
- Atherosclerosis.
- Menopause.
- Prevention of osteoporosis.
- Reducing the period of diarrhoea in infants.
- Prevention with cure of diabetic nerve problems.
- Provided that nutrition to infants who can't take in milk sugars.
- Reducing protein in the urine of people with kidney disease.
- Soy may also offer some relief for the pain, swelling & nausea.

Other Health benefits of black soybean

Black soybeans are beneficial for good health due to the presence of several phytonutrient and are effective in cerebrovascular diseases, cancer, diabetes, cardiovascular disease and neurodegenerative disease (Gaseshan and Xu, 2017). Black soybean (Bhatt) is measured as a treasure house of nutritional and therapeutic properties. It impedes growth of cancerous cells, cholesterol level and has defending effect against a number of fungal, chronic diseases and viral. They are great substitutes for higher-carbohydrate bean along with a favourable effect on the body, giving strength along with vigour, throughout with heaviness (Munro *et al.,* 2003. Shah *et al.,* 2006) reports the antioxidant, antitumor, hepatoprotective and estrogenic activity of black soybean along with its role in preventing benign prostrate hypertrophy, prostrate cancers and ovarian cancers. Black soybean includes high amount of fibers, which makes an individual feel full for longer duration and thus reduce the intake of overall calorie and reduce appetite (Giusti *et al.,* 2017).

Nutritional Importance

Black soybean has a high amount of carbohydrates (31.7-31.85%), protein (32-43.6%), water (5.6-11.5%), lipids (15.5-24.7%), vitamins (Vitamin E and B complex etc) and minerals (calcium, potassium, magnesium, sodium, phosphorous and selenium etc.). (Fetriyuna *et al.,* 2015 and National Research Council 1998 (NRC). The Black soybean lipid composition consists of 86% unsaturated fatty acids, especially linoleic (6.48-11.6%) and oleic acids (3.15-8.82%), linolenic (0.72-2.16%), and hence it is good to human health (Ensminger *et al.,* 1990).

Antioxidant Activity

Soybean has different color of seed coat, including black, green, yellow and red. Recently, black seed coat soybeans have been found to contain flavonoids, tocopherol, isoflavones and anthocyanins in abundance which include total phenolics, free radical-scavenging effect, biological activity and antioxidant properties of ferric reducing antioxidant power and have been shown comparatively high in black soybean than the yellow soybean (Correa *et al*., 2010; Jeng *et al*., 2010; Kumar *et al.*, 2010). The black colour of black soybean is attributed to the compound anthocyanins found in the epidermis palisade layer of the seed coat (Kim *et al.,* 2008). The antioxidant properties are due to the presence of phenolics, which is generally distributed in the seed coat (Kim *et al.,* 2006 and Slavin *et al.,* 2009). It has been generally used as material for oriental medicine and consumed as food for hundreds of years in Asia. Various anthocyanins including cyanidin-3-glucoside, delphinidin-3-glucoside and pelargonidin-3-Glucoside have been identified in black soybean (Choung *et al*., 2001). Black soybean is an excellent dietary source for health promotion and disease prevention. In the last two decades, proteins and isoflavones are the foremost health beneficial components in Black soybean that have received attention. They have potentially active phytochemicals such as isoflavones, phytic acid, sterols, phenolics and saponins, which are potentially of use for prevention of different chronic diseases and human health. Around 20 phenolic compounds in the seed coat, predominantly six anthocyanins, are significantly distributed in numerous varieties of black soybean, (Omoni *et al.,* 2005 and Zhang *et al.,* 2011). A lot of studies have showed that black soybean has the most antioxidant properties compared to other coloured soybeans (Takahashi *et al.,* 2005 and Xu *et al.,* 2008). This helps to decrease the risk of chronic diseases such as cancers and metabolic disorder.

Medicinal properties

Black soybean is a soybean cultivar with a black seed coat. It has been used as an herbal material in traditional medicine for hundreds of years in Asia. In recent times, isoflavones and proteins are major health enhancing compounds in soybean including black soybean that have received major attention (Omoni *et al.,* 2005 and Xiao *et al.,* 2008). Although, they are not sufficient evidence to describe some health benefits exclusive to black soybean because other soybean cultivars contain equivalent levels of these components. In addition to isoflavones, there are several other phytochemicals in black soybean that are potentially helpful in human health, including sterols, phytic acid, saponins, and phenolics. Bhat is also known as treasure house of medicinal properties. Black soybeans and products made from it have rich amount of isoflavones in the human diet hence the use of soybean product being rich in isoflavones is considered useful for a number of chronic disease (Munro *et al.,* 2003).

Conclusion

Black soybean has broadly been consumed by people as food grain as well as for medicinal purpose due to its low price and medicinal properties. The pigment Anthocyanins found in black soybean has antioxidant properties and it can be used to treat cancer, diabetes and cardiovascular diseases. Although it is very difficult to study the exact mechanism by which black soybean is helpful in preventing and modulating in such chronic human diseases. Further comprehensive study needs to be conducted in this regard. Cheaper price and the high content of protein, carbohydrate, lipids, vitamins (Vitamin E and B complex etc) and minerals (calcium) makes it suitable food ingredient for the people. It can be promoted to alleviate malnutrition due to its rich nutrient value and abundance.

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