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Glycine max (L.) merr. A traditional crop of Kumaun Himalaya and ethnobotanical prespectives

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Abstract

Black seeded soybean *Glycine max* (L.) Merr. Is a popular pulse, locally known as bhat and ‘wonder crop’ of the 20th century belongs to the family Fabaceae. It is grown in Kumaun and Garhwal regions and its bordering states and countries in the Himalaya. Black seeded soybean was introduced to India during 1963 with trials conducted at Pantnagar and Jabalpur Agricultural Universities. Black soybean has great potential as an exceptionally nutritive and very rich protein food. It can supply the much needed protein to human diets, because it contains more than 40% protein of superior quality and all the essential amino acids particularly glycine, tryptophan and lysine, similar to cow’s milk and animal proteins. Medicinally it is used here in Kumaun Himalayas in the treatment of Jaundice.

Keywords: soybean, animal, ethnobotanical prespectives, Kumaun

Introduction

Black Soybean *Glycine max* (L.) Merr is grown in Kumaon region and in its bordering states and countries in the Himalayas (Shah, 2006) ^[8], native to eastern Asia. Black Soybeans are mainly a black variety of the soybean. It is believed that soybean was introduced via Burma by traders from Indonesia. As a result, it has been traditionally grown on a small scale in H.P., Kumaon hills of Uttarakhand, Eastern Bengal, Khasi hills and parts of central India. Soybean evolved from *Glycine ussuriensis* a wild legume native to Northern China, it has been known and used in China since eleventh century BC. A study published in the Journal of Medicinal Food reveals that black soybean seed coats have an anti-obesity effect (Sun-Hwa Kwon 2007) ^[10]. It is economically the most important legume in the world. It can supply the much needed protein to human diets, because it contains more than 40% protein of superior quality and all the essential amino acids particularly glycine, tryptophan and lysine, similar to cow’s milk and animal proteins. (Sinclair and Shurtleff, 1975) ^[9]. Furthermore, soybean is useful for crop rotation since it has the nitrogen-fixing ability.

Botanical Discription

It is an erect, bushy herbaceous annual that can reach a height of 1.5 meters. The primary leaves are unifoliate (fig-1), opposite and ovate, the secondary leaves are trifoliate and alternate and compound leaves with four or more leaflets occasionally present. The nodulated root system consist of a taproot from which emerges a lateral root system. The pod is straight or slightly curved varies in length from 2 to 7 centimeter. The shape of seed is usually oval and black in colour (fig-2). Seed size may range from 5 - 40 g per 100 seeds with most varieties between 10 and 20 g per 100 seeds. Black seeded soybean has a typical papilionaceous flower. It consists of a tabular calyx with five sepal lobes; a corolla made up of a standard petal, two lateral wing petals, and two anterior keel petals.

Nine of the ten stamens are fused leaving the posterior one separate. The pistil is made of an ovary that contains 1-5 ovules, a style that accrues towards the standard and a capitate stigma. Pollination occurs before the flowers open.

Soil

Production of soybean starts with its cultivation using the beans itself as seeds. Well-drained and loamy soil with slightly acidic condition is suitable for soybean plantation. Black seeded soybeans are highly adaptable and will grow in moist soils, although they can have trouble in heavy clay. The best soil is loose, rich loam that is moist but well drained. The soil of Kumaun and Garhwal Himalayas is suitable for the growth of black seeded soybean.

Climate

Black seeded Soybean is a subtropical crop, nonetheless, it also can be grown in tropical climate regions with temperature up to 50°C. This crop can grow almost anywhere with a warm growing season, ample water, and sunlight temperature. Black soybeans are usually planted when the soil temperature is between 12.7°C and 15.5°C. Black seeded soybeans can be damaged by subfreezing temperatures, but they are less tender than several other crops, such as corn. Soybeans also need a growing season with temperatures between 21°C and 35°C. The climate of Kumaun Himalaya is suitable for the growth of black soybean.

Origin and Geographical Distribution

There is no clear account of when and where the Black soybean was initially domesticated, however it is said to be originated from china (Qiu and Chang, 2010) ^[13]. Soybean is a subtropical crop nonetheless it also can be grown in tropical climate regions with temperature upto 50°C (Anwar *et al.*, 2016). It takes roughly 2 months for the plant to mature (Fehr and caviness, 1977) ^[4]

Traditional and Medicinal Use

- Black soybeans (BSB) have been widely consumed as food and as material for Oriental medicine for hundreds of years in Asia.
- Research showed that BSB has the greatest antioxidant properties compared to other colored soybeans (Takashaki R. et. al., 2005) In the seed coat, around 20 phenolic compounds, predominantly six anthocyanins, are greatly (13–50 times) distributed in several Black soybean varieties (Zhang et. al., 2011) ^[14], which helps to reduce the risk of chronic diseases such as metabolic disorders and cancers
- The toasted seeds can be eaten as a peanut-like snack.
- The seeds furnish one of the world's most important sources of oil and protein, they can be eaten as they are in soups, stews etc.
- The seed is antidote. It is considered to be specific for the healthy functioning of bowels, heart, kidney, liver and stomach.
- The immature seedpods are chewed to a pulp and applied to corneal and smallpox ulcers.
- The flowers are used in the treatment of blindness and opacity of the cornea.
- The bruised leaves are applied to snakebite.
- The extract from BSB produced significant growth reductions of food borne pathogens such as *Escherichia coli*, *Salmonella typhimurium* and *Campylobacter jejuni* in broth-cultures as well as on chicken skin (Abutheraa et. al., 2017) ^[1]
- In addition, it has been shown to reduce cell death from oxidation. The plant has potential as an active ingredient in preparations for the treatment of skin-ageing in post-menopausal problem.
- The seeds are used in the treatment of Jaundice here in Kumaun Himalayas.
- The oil extracted from black soybean has a very wide range of applications and is commonly used in the chemical industry. The oil is used industrially in the manufacture of paints, linoleum, oilcloth, printing inks, soap, insecticides, and disinfectants.
- The plant is sometimes grown as a green manure.
- The inclusion of soybeans in the daily diet has gained importance due to their high protein content and the presence of phenolic compounds such as isoflavones, which exert antioxidant activities, with potential roles in cancer prevention, heart disease, osteoporosis and a reduction in the menopause symptoms (Levis et al., 2010, Taku et. al., 2011, He & Chen, 2013) ^[7, 12, 1].

Nutritional Values of Soybean

Soybeans are very rich in nutritive components. Besides the very high protein content, soybeans contain a lot of fiber and are rich in calcium, magnesium. The soy protein has a high biological value and contains all the essential amino acids. Soybean are rich in unsaturated fatty acids and low in saturated fatty acids for one 1/2 cup (130g) canned, organic black soybeans.

- **Calories:** 120
- **Fat:** 6g
- **Sodium:** 30mg
- **Carbs:** 8g
- **Fiber:** 7g

- **Sugars:** 1g
- **Protein:** 11g Carbs Half a cup of canned black soybeans has 8 grams of carbohydrate, which is mostly fiber (7 grams) with a small amount of sugar. While the glycemic index and glycemic load of black soybeans have not been calculated, the high fiber content of these beans means they should not cause a blood sugar spike.
- **Fat:** Black soybeans do contain some fat, but it is mostly healthy unsaturated fat (there is only 1 gram of saturated fat per half-cup of cooked black soybeans). Soybeans contain both omega-6 and omega-3 fatty acids.³
- **Protein:** Like many legumes, black soybeans are a good source of plant-based protein, with 11 grams in a half-cup serving. Soy is a complete protein, meaning it contains all the amino acids your body needs (many other plant proteins do not).
- **Vitamins and Minerals:** Black soybeans are a good source of vitamin K, iron, potassium, magnesium, copper, manganese, and riboflavin.[Source: USDA Nutrient Database for Standard Reference]

Chemical Composition

Research has confirmed that the chemical composition of soybeans can be influenced by several factors including the cultivar, growing conditions, genetic improvement and processing technology (Bharadwaj et. al., 1999). Soybeans with black leguments have been widely used for decades due to both their health benefits and their use in Oriental folk medicine due to the presence of phytochemicals including isoflavones, flavonoids, flavones, anthocyanin and saponin (Lee and Cho 2012) ^[6]. Black tegument, presented high total isoflavone levels (546 mg 100 g⁻¹), with an oleic acid level above and linoleic acid level below the standards established by the Codex Alimentarius for soybean oil, with values of 31.37 mg g⁻¹ and 47.36 mg g⁻¹, respectively (Ciabotti et al., 2019) ^[3]



Fig 1: Crop of black soybean



Fig 2: seeds of black soybean

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