

A Lesser Known Underutilized Sword bean [*Canavalia gladiata* (Jacq.) DC.] : Cultivation and Conservation in Bihar and Jharkhand

There are several underutilized plant species available in nature. Many cultivated vegetable plant species, which originated in the wild, constitute an important part of the daily diet of both rich and poor people. *Canavalia gladiata* (Jacq.) DC., commonly known as Sword bean, belongs to the family Fabaceae. This species was collected from Kanihmoh Tola, Bihar, and Chihutia, Mohanpur, Jharkhand. Sword bean has been known for its traditional medicinal properties and is used to treat a number of diseases, such as cancer, sinus infections, and supportive conditions. It also possesses hypertension-relieving, antioxidant, and antibacterial effects. Despite its therapeutic potential, this plant can also be exploited for vegetable use. The present report is an effort by the authors to raise awareness about the conservation, cultivation, and health benefits of the Sword bean.

THE genus *Canavalia* DC., belonging to the family Fabaceae, is represented by 62 species worldwide and is native to the tropics and subtropics. In India, this genus is represented by 8 species, but only 3 species—*Canavalia africana* Dunn, *Canavalia ensiformis* (L.) DC., and *Canavalia gladiata* (Jacq.) DC.—have been reported from Bihar and Jharkhand. Among these, *Canavalia ensiformis* (L.) DC. is widely cultivated in the states of Bihar and Jharkhand. *Canavalia gladiata* (Jacq.) DC., popularly known as Sword bean, mostly grows wild and is rarely cultivated. This species is traditionally consumed by aboriginal and rural communities in many parts of India. During survey and exploration work at Kanihmoh Tola, Bihar (24.6875280 N and 86.7871250 E) and Chihutia, Mohanpur, Jharkhand (24.4827750 N and 86.69511750 E), for the collection of threatened plants under a project sponsored by the MoEF & CC, Government of India, we found an interesting plant, which is scarcely cultivated by villagers in home boundaries made of bamboo sticks and shrubby plants for vegetable and livestock fodder purposes. The plant was identified as *Canavalia gladiata* (Sword Bean). In addition to its medicinal properties, the young leaves, flowers, tender green pods, and seeds of the Sword bean are also consumed as vegetables in Bihar and Jharkhand. Considering its importance in treating human ailments and the lack of awareness about its cultivation among tribal communities, the present investigation was carried out to educate tribal and rural populations about its large-scale cultivation and conservation.

Morphological description

Canavalia gladiata is a perennial climbing shrub with

trifoliolate leaves; leaflets are ovate in outline with an acute apex, 10–15 cm long and 8 cm wide, and glabrous on both surfaces. It bears large pinkish flowers in axillary racemes and large sword-shaped pods, 20–30 cm long and 2–3.5 cm broad, with strongly developed ridges. The seeds are rosy pink in colour, strongly compressed, and have a hilum nearly as long as the seed.

Phenology

Flowering: August–December

Fruiting: November–January

Nutritional and medicinal importance

Sword beans are valued for their nutritional content, medicinal properties, and uses in traditional medicine. It is a good source of nutrients and also used as fodder for livestock. Medicinal properties include antioxidant, anti-inflammatory, and antibacterial effects. Sword beans are traditionally used to treat cancer, hypertension, sinus infections, and supportive conditions. They have been used in traditional medicine in countries such as Korea, Japan, and Malaysia. The bean extract is used in soaps to treat acne and athlete's foot. The Hakka people of China use the root of the sword bean for knee pain.

Chemical composition

The mature seed contain carbohydrate (33.3–51.2%), protein (26.8–29.2%), fat (2.8–3.1%), fiber (33%), and ash (3.9–4.1%) on a dry weight basis.

One hundred grams of green sword bean contains:

Water: 83.6 g

Energy: 247 kJ



Habit of Sword bean plant, growing on bamboo hedge



Dried pods with seeds of Sword bean

Protein: 4.6 g
 Fat: 0.4 g
 Carbohydrate: 10.7 g
 Fiber: 2.6 g
 Calcium: 33 mg
 Potassium: 66 mg
 Iron: 1.2 mg
 Vitamin A: 40 IU
 Thiamin: 0.2 mg
 Riboflavin: 0.1 mg
 Niacin: 2 mg
 Ascorbic acid: 32 mg

Bioactive compounds in Sword bean include flavonoid, anthocyanin, flavanol, isoflavone, flavanone, tannin, saponin, terpenoid, and other compounds.

Propagation

Sword bean can be propagated by seed and cutting. The seed germinate in May–June for the next year's crops. Large-scale cultivation can be achieved using tissue culture techniques.

Cultivation

Sword bean can be found from sea level up to 900 meters in elevation. It requires temperatures between 20°C and 30°C and annual rainfall of about 900–1500 mm, evenly distributed. Sword bean can tolerate a wide range of soil types, with a pH between 4.3 and 6.8. It can grow in dry laterite soil and thrive under drought conditions due

to its deep-rooted system. It is a quick-growing climber that needs support for healthy growth. Seeds are sown 2–3 cm deep with a spacing of 45–60 cm between plants and 80–100 cm between rows.

Ethnobotanical Information

Tribal communities in Bihar and Jharkhand use this plant in their daily diet. The flowers of *C. gladiata* are cooked and consumed as a vegetable due to their delicacy and flavour enhancement. The Santhal community is particularly fond of dishes prepared from this plant.

CONCLUSION

Germplasm of *Canavalia gladiata* has been collected from the tribal belts of Bihar and Jharkhand and preserved at the Bhagalpur University Botanical Garden, Department of Botany, T M Bhagalpur University, Bhagalpur, for further research and development. Considering its value as an edible seed (pulse), pods and flowers (vegetable), and as a medicinal plant, it may be considered a multipurpose species for cultivation and conservation. As it closely resembles *C. ensiformis*, there is need of further systematic studies of this plant.

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