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Cultivation practices of Jack Bean

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Important points of Jack bean	
Botanical name	*Canavalia ensiformis* auct. non (L.) DC.
Family	Leguminosae
Chromosome number	2n = 22
Origin place	Maxico/South and Central America
Edible portion	Tender pods
Inflorescence type	Axillary receme
Seed colour	White

Introduction:

Canavalia ensiformis (L.) DC commonly known as jack bean is a legume native to Central and South America from Mexico south to Brazil and Peru, and to the West Indies. The earliest known record of its existence is from about 900 A.D., from Oaxaca in central Mexico. It is cultivated on a small scale throughout the tropics, but is of relatively little economic importance in world trade.

Botanical description: Plant is an erect bushy annual, 1-2 m in height, leaves trifoliate, shortly hairy, leaflets up to 20 cm long, slightly curvaceous, flowers in raceme, rose or violet, fading towards base; pods stout, straw coloured slightly compressed, pendent 8-20 seeded. Seeds are relatively large measuring 1.88 cm in length and 1.2 cm in width, 1.09 cm in thickness.

Seed colour is white. The 1000 seed weight is 1.78 kg. The seed coat formed about 13.3 per cent of the whole seed, resulting in high fibre content of the meal. About 8 species occur in India of *Canavalia* genus of which two are cultivated to some extent as vegetable pulse and fodder.

Origin and distribution: The jack bean has been recovered from archeological sites of Mexico dated at approx. 3000 BC. It is also cultivated to a limited scale in India.

Uses and Importance: Jack bean commonly grown for the young pods and immature seeds which are used as food for human and animal. It is grown for its tender pods, fodder and green manure crop. The immature pods and seeds contain about 75.2%

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Flowers of Jack bean


Pods of Jack bean


Seeds of Jack bean

water and 6.9% protein It is also good source of calcium, Zinc, Magnesium, Potassium and Copper. Green pods are rich in protein (28.3%). It is also source of concanavalin A, a lactin used in biotechnology applications, such as lectin affinity chromatography.

Constituents	Pods	Seeds
Moisture (g)	78.5	12.0
Protein (g)	6.9	25.4
Fat (g)	0.5	1.3
Fiber (g)	3.3	4.9
Carbohydrates (g)	13.3	57.1
Ash (g)	0.8	4.2
Calcium (mg)	33.0	96.0
Phosphorus (mg)	66.0	343.0
Iron (mg)	1.2	4.9
Riboflavin (mg)	0.10	0.15
Niacin (mg)	2.0	2.1
Ascorbic acid (mg)	32.0	0.0
Vitamin A (µg)	15	10.0

The limiting amino acids are sulphuramino acids, isoleucine and valine. Lysine content is around 5.9 g/16 g N and its availability is 84.1 percent. Seeds are utilized to produce urease enzymes on commercial scale. The seed contain some toxic proteins, phytohaemagglutinins (also known as agglutinsor lectins) which have been classified as globulins. A globulin having urease activity and three other globulins, viz. canavalin, concanavalin A (yield 2.2%) and concanavalin B have been isolated in crystalline form. Among these, the most nutritionally important and other constituent present in seeds are lupeoside, arginic, desamino-canavanine, canavanine (3.14%), etc.

Climate and Soil: Tropical in nature, however comes well in sub-tropics**.** It is a typical short day plant and thrives well at 10-12 hour day length. Seed germinates at 25-27°C temperature and consume much water up to 200%. It can be raised successfully on various kinds of soil. Optimum pH range for crop growth is 5.0-7.0. Jack bean requires adequate moisture during early vegetation as well as during flowering.

Cultivar: There is no improved cultivar in jack bean.

Propagation: By Seeds

Sowing time and seed rate: Seeds are sown directly in the pit before onset of monsoon. The seed rate followed is one or two seeds per pit. Optimum sowing time is May-June and September-October. Sowing time in NEH regions is March-April. Seeds are sown 7.5 cm deep and 30 cm apart and 1.5 m between rows. Spacing with 45×30 cm gives maximum height.

Seed germination and treatment: Seed treatment with *phosphobacterium* (*Bacillus megaterium*) enhanced seed yield.

Manures and fertilizres: FYM-10 t/ha along with 100-150 kg superphosphate gives good harvest. NPK is applied at 60:50:50 kg/ha may be applied as basal dose and top dressing in several splits. The most limiting factors for growth were excess of Al, P, deficiency and low pH.

Intercropping: In jack bean cultivation, one row of maize and two rows jack bean (uesdas green manure). Highest potato yield was obtained with the application of green manure of jack bean plus 40 kg N/ha. In semi arid region of West Africa, jack bean is much preferred as a cover crop owing to its availability to grow longer periods in dry season and maintaining higher moisture content compared with other crops.

Intercultural operation: When the plants of jack bean are a few cms high, the ground should be weeded. It is a drought tolerant crop, however proper moisture should be maintained at the time of flowering and pod development. Irrigation at every 8 days reduced growth and altered dry matter partitioning. Cutting above the 2ndtrifoliate leaf node at 76 DAS increased seed yield compared with uncut control.

Harvesting: For vegetable use, harvesting of pods should be made when pods are tender. The marketable pods are available from 68 to 74 days in case of early types where as 110 days for pole types.

Yield: Yield of green pods varies from 2.5-3.5 kg per plant. In general, pole types give higher yield as compared to bush types. For pulse purpose, crop is harvested when pods become fully dry. Seed yield varies from 60-70 q/ha.

Post harvest management: Generally, Jack bean will keep indefinitely well when stored in a cool and dry place. Never store dry beans in the refrigerator. Jack bean can also be dried and stored.

Plant protection measure:

Diseases: Fruit rot (*Fusarium solani*), Collar rot and pink rot (*Sclerotium rolfsii*), Seedling blight (*Colletotrichum capsici*), Downey mildew, Pod blight and some virus borne disease have also been noticed. Using disease free healthy seeds and practicing crop rotation and spraying of Mancozeb @ 2% may be followed.