Indian Farmer
Volume 13, Issue 03, 2026, Pp. 107-112
Available online at: www.indianfarmer.net
ISSN: 2394-1227 (Online)

Original Article

OPEN ACCESS

Multi-Purpose of the Winged Bean [*Psophocarpus tetragonolobus* (L.) DC.], the Neglected Nutritionally Rich Legume

H.L. Raiger and N.K. Jajoriya

ICAR-National Bureau of Plant Genetic Resources, New Delhi

**Corresponding author: drvikasagro@gmail.com*

Received: 11/03/2026 *Published:18/03/2026*

Winged bean (*Psophocarpus tetragonolobus*), commonly known as the Goa bean, Four angled bean, Manila bean, Asparagus pea, Princess pea and Kacang botol (Malaysia), is a tropical legume native to Papua New Guinea. It belongs to family Fabaceae/ Legminosae and tribe Phaseoleae. It grows abundantly in hot, humid equatorial countries, from Philippines and Indonesia to India, Burma and Sri Lanka. It does well in humid tropics with high rainfall.

The winged bean plant grows as a vine with climbing stems and leaves, 3-4 m in height. It is an herbaceous perennial, but can be grown as an annual. It is generally taller and notably larger than the Common bean. The bean pod is typically 15-22 cm (6-9 inches) long and has four wings with frilly edges running lengthwise. The skin is waxy and the flesh partially translucent in the young pods. When the pod is fully ripe, it turns to ash-brown color and splits open to release the seeds. The large flower is a pale blue. The beans are similar to soybeans in both use and nutritional content (29.8% to 39% protein). It is a self pollinated crop with 2n=18, but there are several other reports where chromosome number has been indicated to be either 2n=16 or 2n=20 or 2n=26 (Bhagmal, 1994). It is sensitive to drought, frost, salinity and water logging.

Uses

- This bean has been referred as "one species supermarket" because practically the whole plant is edible. While the beans are used as a vegetable, the other parts (leaves, flowers, and tuberous roots) are also edible.

- The tender pods, which are the most widely eaten part of the plant, can be harvested within two to three months of planting. These pods are cooked with chillies or eaten with fish and meat in many countries. The flowers are often used to color rice and pastries. The flavor of the beans has a similarity to asparagus. The young leaves can be picked and used as a leafy vegetable, similar to spinach. Tender fibreless pods used as vegetable contains nearly 3 % protein and are rich in calcium, iron, thiamine and ascrorbic acid .
- The roots can also be used as a root vegetable, similar to the potato and have a nutty flavor. They are also rich in protein much more than potatoes.
- Seeds contain protein and oil similar to that of soybean and are rich in antioxidants and tocopherol. After extraction of oil, the cake can be used as cattle feed. The oil can be used for cooking, illumination and soap making.
- The dried seeds can be used as flour and also to make a coffee-like drink.
- Each part of the winged bean is a source of vitamin A and other vitamins.

Distribution and Adaptation

Winged bean is regarded as a crop of hot humid tropics. The crop thrives well from sea level to 2000 msl. Winged bean is distributed throughout Asia and West Africa. In India, it is confined to humid sub-tropical parts of North-Eastern region comprising states of Tripura, Manipur, Mizoram, Nagaland and Assam. It also occurs sporadically in ghats of Maharashtra, Karnataka, Kerala and Orissa.

Variety Development

A total of 213 germplasm accessions of Winged bean (Psophocarpus tetragonolobus (L.) Dc.) are present in National Gene Bank (NGB) for long-term conservation. These genetic materials are available to Winged bean breeders for utilization in their breeding programs. Promising accessions for green vegetable also possessed semi-dwarf plant habit, condensed internodes, early flowering (97-105 days), medium long tender pods of pale green of green colour and very good fruiting. Collections identified for green pods, 4 for fodder, 5 tolerant to frost/cold, 5 photosensitive, 5 have double pod, 7 in tuber yield and 6 as good seed types. Similarily, accessions rich in protein contents white six were indigenous collections *viz.* IC 17004, IC 17006, IC 26944 and IC 26949 and 13 were exotic collections *viz.* EC 27884, EC 38826-1, EC 38955, EC 38957, EC 38957, EC 114273-1, EC 116887, EC 116884, EC 118031 and EC 118345.

Table 1: Seven dual purpose (seed and vegetables) Winged bean varieties were released under the umbrella of AICRN on Potential crops in India.

S. No.	Varieties	Year	Economic product	Av. yield (q/ha)	Characteristics	Recommended areas	Released by	Notification No.	Date
1	AKWB-1	1991	Green pods	105.00	Dual purpose (seed and vegetable), high pod yield	All winged bean growing areas	ICAR-NBPGR RS Akola	S.O. 527(E)	16.08.1991
2	Chhattisgarh Chaudhari Sem-2	2017	Green pods	124.00	Dual purpose (seed and vegetable), high pod yield	Chhattisgarh	IGKV, Ambikapur	S.O. 261 (E)	14:09:2018
			seeds	20.00					
3	Indira Winged Bean-2	2018	Green pods	128.00	Dual purpose (seed and vegetable), high pod yield	Chhattisgarh, Jharkhand and Maharashtra	IGKV, Ambikapur	S.O. 1480 (E)	01.04.2021
			seeds	19.00					
4	Phule chardhari wall (PWB 11-2)	2021	Green pods	130.00	Dual purpose (seed and vegetable), high pod yield	Maharashtra, Chhattisgarh and Jharkhand	MPKV, Rahuri	S.O.8(E)	24.12.2021
			seeds	12.90					
5	Phule shrawani (PWB-17-18)	2024	Green pods		Dual purpose (seed and vegetable), high pod yield	Maharashtra, Chhattisgarh Uttarpradesh and Jharkhand	MPKV, Rahuri	S.O. 4388(E)	08.10.2024
			seeds						
6	Birsa Kamrenga-1(RWB-13)	2024	Green pods		Dual purpose (seed and vegetable), high pod yield	Jharkhand	BAU, Ranchi	S.O. 4388(E)	08.10.2024
			seeds						

AKWB-1

Indira Winged Bean-1

Chhattisgarh Chaudhari Sem-2'

Indira Winged Bean-2

Phule Shrawani

Birsa Kamrenga-1

Phule Chardhariwall

Winged bean varieties

Promising genotypes and land races available

Apart from the above released variety there are other improved genotypes which have performed well in Indian plains. Based on the average performance tested over locations and years in All India Coordinated Research Network on Underutilized Crops, following genotypes were selected for better pod and seed yield:

EC 178313 : Average seed yield recorded in AICRP trials 8.84 q/ha with 165 days to maturity.

IC 026945 : Average seed yield recorded in AICRP trials 8.81 q/ha with 163 days to maturity

EC 142665 **:** Average seed yield recorded in AICRP trials 8.74 q/ha with 163 days to maturity.

EC 178331 **:** Average seed yield recorded in AICRP trials 8.41 q/ha with 163 days to maturity.

Dwarf Mutant : Average seed yield recorded in AICRP trials 8.22 q/ha with 161 days to maturity and has been developed at UAS Bengalore

Mysore Local : Average seed yield recorded in AICRP trials 7.69 q/ha with 163 days to maturity and has been developed at UAS Bengalore

Agronomic Management

Hot and humid climate is ideal for the cultivation of winged bean. It can tolerate 15.4 to 27.5 ^{o}C temperature and 700-4100 mm annual rainfall. However, a temperature range of 20-30 ^{o}C is optimum for its growth, flowering and fruiting. Day temperature of 30 ^{o}C and night temperature of 22 ^{o}C is most favourable for vegetative growth. Flowering is observed from mid-September to October when short day condition prevails. The crop grows well up to an elevation of 2000 m.

Preparation of land

Prepare the land by ploughing followed by levelling. Well rotten FYM is mixed with soil in the trenches.

1. **Soil:** Sandy to heavy clays, well-drained sandy loam.
2. **FYM:** 8-10 t/ha or Vermi-compost 5 t/ha, 10-15 days before sowing followed by ploughing & levelling.
3. **Fertilizer Dost:** N:P:K::50:80:50. Half dose of nitrogen (25N), full dose of phosphorus (80P) and Potash (50K) (if needed) at the time of sowing. Remaining nitrogen (25N) applied after 40-60 days of sowing after weeding of crop.
4. **Time of Planting:** June-July
5. **Seed Rate:** 15-20kg/ha pre-soak for one to two days; Seed depth:3-4cm
6. **Spacing:** Line Sowing With plant of plant: 45cm and row to row: 60cm.

7. **Seed germinates** within 5 to 7 days after sowing and needs maximum care till it attains a height of about 25-30 cm. After establishment of stand, its maintenance is easy.
8. **Weed Control:** one hand weeding 15-20 DAS is required to control weeds during early growth period.
9. **Staking:** Staking is very important practice to obtain good and quality yield due to indeterminate stem growth.

Water management

The first irrigation is given immediately after sowing. Avoid rapid water flow to prevent washing off of seeds. Irrigations shall be given at frequent intervals except on rainy days. Proper drainage of water should be ensured to avoid occurrence of diseases and pests.

Inter-cultural Operation: First hand weeding should be done 15-20 days after sowing and second 35-40 days after sowing for the management of the weed. Later the broad leaves helps not to allows weeds to survive. If green manure crop is grown, weeding operations can be reduced.

Harvesting & Storage: Green pods can be harvested at tender stage from about 10 weeks after sowing. Winged bean can be stored in a plastic bag tightly tied at the neck to keep them fresh. The shelf life of the pods can be increased to 4 weeks under storage temperature of 10 ^{o}C and the 90% relative humidity. Dry grains for 2-3 weeks up to 11-13% moisture content and stored in iron drums or earthen pots.

Yield: In India, yields reported from experimental plots are of the order of 7 – 15 q/ha for seed, 40 – 95 q/ha for green pods and 48 – 60 q/ha for tubers. There is an ample scope of improvement in yields by use of improved cultivation practices.

Diseases and Insects

There are no major reports of incidence if disease and insect-pest on winged bean in India. However, false rust (Synchytrium psophocarpi), leaf spot (*Pseudocercospora Psophocarpi*) are the important fungal diseases. Similarly, *Maruca testulalalis* and *Hermoceplachna signatipennis* and root knot nematodes may affect the crop. Therefore, suitable plant protection measures may be taken to minimize yield losses.

Nutritional significance

Winged bean has been recognized as a crop having much promise for nutritional security in the coming decades. Winged bean tubers are notably rich sources of starch, protein, and B-complex, Vitamine C. Winged beans provide adequate amounts of protein minerals, and vitamins. In addition, Thiamine, phridoxine (vitamin B-6), niacin, and riboflavin are some of the B-complex vitamins embedded in these beans. Some of the essential minerals such as iron, copper, manganese, calcium, phosphorus, magnesium are concentrated in them. Green leaves of Winged bean are an excellent source of fiber, vitamin-C, Vitamin-A, and minerals.

It has been observed that proteins present in legumes have low nutritive value which is mainly attributed to low amounts of Sulphur-containing amino acids, less digestible proteins and

anti-nutritional factors. The cause of low digestibility of proteins is referred to the presence of protease (trypsin and chymotrypsin) inhibitors and tannins. The presence of trypsin inhibitor, hemagglutinin, tannins and phytic acid in winged bean seeds is well substantiated. Combined and possibly synergistic effect of all these factors are responsible for the toxicity of raw winged bean. To eliminate the negative effect of these anti-nutritional factors, to reduce certain anti-nutrients, to improve the nutritional quality it can be destroyed by cooking. The amino acid content of immature pods was generally lower, whereas, the non-protein nitrogen content was higher. The digestibility is lowest (72.8%) compared with other legumes.

Table 2. Nutritive value (per 100g) of underutilized and major food legumes

Crop	Crude protein (g)	Fat (g)	Carbohydrate (g)	Fiber (g)	Ash (g)
Rice bean	20.9	0.9	60.7	4.8	4.2
Faba bean	26.2	1.3	59.4	6.8	3
Adzukibean	19.9	0.6	64.4	7.8	4.3
Winged bean	32.8	17.0	36.5	4.1	3.6
Chick pea	19.4	5.6	60.9	2.5	3.1
Pigen pea	21.6	1.4	72.7	8.1	4.2

Future thrust and prospects

While past research was limited by poor infrastructure, recent advances in genomics, transcriptome sequencing, and tissue culture now allow scientists to improve the crop by comparing it to established legumes like soybean. Future breeding aims to eliminate anti-nutritional factors (like tannins) and improve the plant's sensitivity to cold, waterlogging, and specific light cycles (photosensitivity). Often called the "forgotten vegetable," it is a powerhouse of nutrition that can combat malnutrition and provide a stable income for resource-poor farmers in marginal upland areas. The crop is hardy enough to withstand adverse climate changes, making it a vital tool for future food security. To turn this local legume into a crop of worldwide impact, there is an urgent need for germplasm conservation, increased public awareness, and supportive government funding and policy.