

Status, potential and improvement of Indian bean

The genus *Lablab* refers to the hyacinth bean, bonavist bean, sem, egyptian bean, field bean, Australian pea, Indian butter bean and belongs to the family leguminosae (Fabaceae). In Flora Indica, Roxburgh (1832) exemplify 'Dolichos' in *Dolichos lablab* as Greek word that symbolize long pod and 'lablab' as Arabic or Egyptian word implying shallow vessel enclosing seed. Backer (1984) on the basis of shape, texture and angle of attachment of seeds to the suture of the pods categorized all the five cultivated varieties in two cross compatible botanical groups i.e., *Lablab purpureus* var. *typicus* and *Lablab purpureus* var. *lignosus*. *Lablab purpureus* L. var. *typicus* (Syn. *Lablab niger* var. *typicus*) is widely cultivated as garden type bean with soft pods that has long axis in which seeds are arranged parallelly to the suture and *Lablab purpureus* var. *lignosus* (Syn. *Lablab niger* var. *lignosus*) where the seeds are arranged at right angle to the suture, is mainly cultivated as field bean and most commonly used as pulse containing more protein (20.9-29.2%) than *Lablab purpureus* var. *typicus*.

PODS of *Lablab purpureus* var. *lignosus* is highly preferred by farmers and consumers as they radiate certain oily substances that gives pods their characteristic fragrance. This distinctive aroma of *Lablab purpureus* var. *lignosus* pods is due the presence of two dominant fatty acids i.e., trans-2-dodecenoic acid and trans-2-tetradecenoic acid.

Botany and floral biology

Hyacinth bean plant is a tropical, dicotyledonous, herbaceous and temperature sensitive flowering plant with

annual growth habit. Plants are robust twiner with woody stem, having large trifoliate heart shaped leaves along with broad ovate-rhomboid shape leaflets measuring 7 to 15 cm long and 4.5 -15 cm wide. The dorsal side of the leaf is smooth with the ventral side being hairy. Plant consists of tap root system and main root has several lateral roots distributed uniformly along the main axis. Flower is usually bisexual, hypogenous and pentamerous varies from white, pink to purple in colour with axillary, erect and raceme inflorescence. Stamens are usually arranged

Variability in pods

Character	Range
Pod length	4.45-16.0 cm
Pod diameter	1.24-3.73 cm
Pod weight	3.0-13.4 g
Pod colour	Green, light yellow, brown, dark brown, whitish green, whitish brown, greenish brown, purplish white, greenish yellow and yellowish green
Seed colour	Greenish brown, yellowish brown, blackish brown, white, yellowish white
Seed length	0.75-1.35 cm
Seed diameter	0.64-1.32 cm
Seed weight	18.5-38.3 g



in 9+1 configuration, with uniform anther, having sessile ovary with incurved style and terminal glabrous stigma. Seeds are variable in colour such as white, ochreous with black dots or black with white dots, uniformly brown or black. The flowers generally open two days after anther dehiscence. The presence of superfluous floral nectarines at the bottom of the corolla attract bees, flies and ant, however, heavy insect pressure may suppress the development of wing petals that could lead to stamen and stigma exertion. In hyacinth bean, flowers bloom between 6.30 h to 7.00 h and are predominantly a self-pollinated crop. However, insect mediated cross pollination occurs up to an extent of 6-13%. The optimum time for emasculation of hyacinth bean flower ranges between 16.30-17.30 hours and for hand pollination 7.00-9.00 hours, the next day in the morning. Pollens are fertile on the day of anthesis which remains viable for 42 hours at room temperature of 28.5°C with 85-90% relative humidity. The pollens can remain viable for much longer duration i.e., up to 50-60 hours if they are stored under cold environment in refrigerator.

Varieties developed

Pole type

Kashi Haritima (VRSEM-8):

This variety was developed at ICAR-IIVR, Varanasi through selection of local material collected from Tripura of NEH and released by Central Variety Release Committee in 2012 for commercial cultivation in Sikkim, Meghalaya, Manipur, Nagaland, Mizoram, Tripura, Arunchal Pradesh, Punjab, Uttar Pradesh, Bihar, Madhya Pradesh, Maharashtra, Karnataka, Tamil Nadu and Kerala. Average yield is 380.0 q/ha (green pods) in fruiting period from last week of November to first week of March and give 28.23% more yield compare with national check variety Swarn Utkrisht.



Kashi Khushhal (VRSEM-3): This variety is cluster bearing and very early in fruiting. Pods become ready for harvesting in 95-100 days after seed sowing. Fruiting starts from last week of September and continues till second week of February in agro climatic condition of Varanasi. An average green pod yield is 357.0 q/ha. This variety was released and notified by SVRC in 2018 for commercial cultivation in Uttar Pradesh.



Kashi Sheetal (VRSEM-11): This variety was released and notified by SVRC in 2018 for commercial cultivation in Uttar Pradesh. Average pod yield is 359 q/ha green pods which is 30.6% more yield compared with

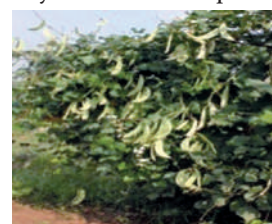


national check variety Swarn Utkrisht. This variety has been found as tolerant to DYMV in field condition.

VRSEM-6: This variety was developed at ICAR-IIVR, Varanasi through selection and tested in AICRP (VC) from 2008-2011. High yield was reported by reporting centers like Coimbatore (Tamil Nadu), Raipur (Chattisgarh), Kalyani (West Bengal), Parbhani (Maharashtra), Bengaluru (Karnataka), Portblair (Andaman and Nicobar) and Barapani (NEH). Average pod yield is 369.0 q/ha.



VRSEM-186: This variety was developed at ICAR-IIVR, Varanasi through selection and tested in AICRP (VC) from 2007-2010. Average yield is 341.0 q/ha green pods which is 22% more yield compared with national check variety Swarn Utkrisht. This is cold tolerant variety (less than 6°C) and also tolerant to DYMV under field condition.



VRSEM-501: This variety was developed at ICAR-IIVR, Varanasi through individual plant selection and tested in AICRP (VC) from 2008-2011. Average yield is 343 q/ha green pod.



Bush Type

VRBSEM-3: This advance line has been developed through hybridization using parentage VRSEM-11 (Pole Type) and Arka Vijay (Bush type) followed by single plant selection at ICAR-IIVR, Varanasi and is being under AICRP (VC) trial from 2016. Pods are light green measuring 12.5-14.2 cm in length and 1.8-2.0 cm in width. This variety yielded an average yield of 360 q/ha with high protein (93.5 mg/g) and carotenoid (0.212 mg/g). This variety is tolerant to DYMV under field condition during cropping season.



VRBSEM-9: This advance line has been developed through hybridization using parentage VRSEM-11 (Pole Type) and Gomachi Green (Bush Type) followed by single plant selection at ICAR-IIVR, Varanasi and is being under AICRP (VC) trial from 2016. Pods are light green measuring 10-12 cm in length and 1.3-1.5 cm in width. This variety yielded an average yield 350 q/ha with high phenol (1.81 mg/g) and chlorophyll (1.29 mg/g). This variety is tolerant to DYMV under field condition during cropping season.



Production tips

Sowing time	Pole type: 15 July to 10 th August Bush type: Last week of September to Last week of October				
Seed rate and spacing	Seed rate: Pole type – 30-35 kg/ha Bush type – 50-60 kg/ha Spacing Pole type : Row to Row – 2.5 m, Plant to Plant – 1.0 m Bush type : Row to Row – 60 cm, Plant to Plant – 45 cm				
FYM and fertilizers	Well rotten FYM @ 200 q/ha is mixed in the field 15 days before seed sowing. Nitrogen, phosphorous and potash are applied in the ratio of 40:30:30 kg/ha.				
Weed control measures	Three to four manual weedings are required. One hoeing and earthing up is done at 40 days after seed sowing. Subsequently two to three manual weeding are required at 25-30 days interval.				
Plant protection	Control of leaf spot and anthracnose diseases with 2-3 sprays of Dithane Z-78 or Dithane M-45 @ 1.5 g/liter of water at 20 days interval starting from second week of December till last week of January. Control aphids with 2-3 sprays of cypermethrin @ 2 ml/liter at 15 days interval starting from second week of January till last week of January depending upon climatic condition. Control pod borer with 3 sprays of Rogor @ 1.5 ml/liter of water or Indoxacarb @ 0.5 ml/ litre water at 15 days interval starting last week of January till last week of February.				
Irrigation doses and timing	Irrigation is must at the time of flowering, fruiting in the month of November to December depending upon the moisture level in the field. Subsequent irrigations are done as per need.				
Harvesting	Harvest edible pods 25 days after fruit setting				
	Type of variety	Sowing time	H a r v e s t i n g started	Peak harvesting period	Economical total harvesting
Pole type					
	Kashi Haritma	Second week of July	Second week of December	December to last week of January week	5-6
	Kashi Khushaal	Second week of June	Last week of September	Last week of October to first week of December	6-7
	Kashi Sheetal	Second week of July	Second week of November	Last week of November to last week of December	5-6
Bush type					
	VRBSEM-3	Last week of September	Last week of November	Last week of December to first week of March	4-5
	VRBSEM-18	Last week of September	Second week of November	Last week of December to third week of March	6-7
	VRBSEM-14	Last week of September	Last week of November	Last week of December to second week of February	4-5

Market price variation of Indian bean in market at Varanasi

Month	Farmer field price (Average of three years)	Market price (Average of three years)
September	50-60	75-80
October	45-55	65-70
November	25-30	45-60
December	15-20	30-40
January	15-20	25-30
February	25-30	45-50
March	35-40	55-60
April	20-25	35-40

VRBUSHSEM-14: This advance line has been developed through interspecific hybridization of Kashi Sheetal (Pole) and Konkan Bhushan (bush) followed by single plant selection. Plants are bushy in growth and attained height upto 45 cm and took 51 days for 50% flowering if seeds are sown in third week of September. Flowers are white and borne light green flat pods measured 12.6 cm in length and 1.8 cm in width. Peak fruiting period is first week of January and continues upto last week of March. Edible fresh pod holds protein 77.6 mg/g FW, phenol 1.36 mg/g FW and prolene 1.42 ug/g FW. Yield potential is 215.0 q/ha in 4-5 harvesting. During fruiting period this line is tolerant to DYMV.



VRBSEM-18: This advance line has been developed through interspecific hybridization of Kashi Sheetal (Pole type) and Konkan Bhushan (bush type) followed by

single plant selection. Plants are bushy in growth and attained height up to 51 cm and took 45 days for 50% flowering if seeds are sown in third week of September. Flowers are purple and borne light purple twisted pods measured 9.2 cm in length and 1.6 cm in width. Peak fruiting period is second week of January and continues upto last week of March. Yield potential is 245 q/ha in 4-5 harvesting. During fruiting period this line is tolerant to DYMV.



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