



Genus Vigna Savi in India

an illustrated guide for species identification

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Cover photo: *Vigna sublobata*

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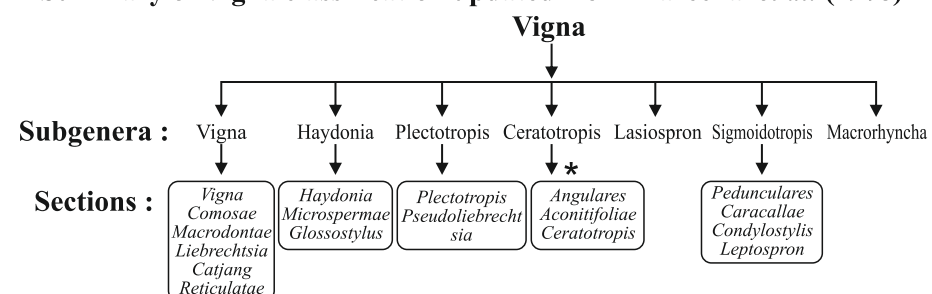


Introduction

Fabaceae, the third largest family of flowering plants with approximately 650 genera and 18,000 species (Polhill & Raven, 1981) of legumes includes important grain, forage and agroforestry species. Legumes are excellent colonizers of disturbed ecosystems and low nitrogen environment which also make them economic and environment friendly crops. Legumes account for 27% of world's primary crop production, with grain legumes alone contributing 33% of dietary protein nitrogen (N) needs of human (Vance *et al.*, 2000).

Vigna, originally published by Savi in 1824 who named it after Domenico Vigna, Professor of Botany at Pisa (Baudoin & Maréchal, 1988). The genus *Vigna* Savi is a large pantropical genus with about 104 (Lewis *et al.*, 2005) species distributed among 7 subgenera *viz.* *Ceratotropis*, *Haydonia*, *Lasiospron*, *Macrorhyncha*, *Plectotropis*, *Sigmoidotropis* and *Vigna* (Marechal *et al.*, 1978). There are 18 cultivated species (Maxted *et al.*, 2004) including pulses like black gram, mung bean, moth bean, cowpea, azuki bean and rice bean. Black gram, mung bean and moth bean were first domesticated in India. Wild relatives of these crop plants are widely distributed in India, exhibit greater diversity and constitute an important source of germplasm for improvement of cultivars. Thus, Indian centre is centre of origin as well as centre of diversity for these crops. India, with 24 species of *Vigna* (Sanjappa, 1992), represents secondary centre of species diversity for all the three sections of subgenus *Ceratotropis* and are also known as Asian *Vigna*. Babu *et al.* (1985) revised Tribe Phaseoleae for India in which 23 species of *Vigna* are reported and described. Asia is the centre of diversity for subgenus *Ceratotropis* in *Vigna*. (Tomooka *et al.*, 2002).

Summary of *Vigna* classification updated from Marechal *et al.* (1978)

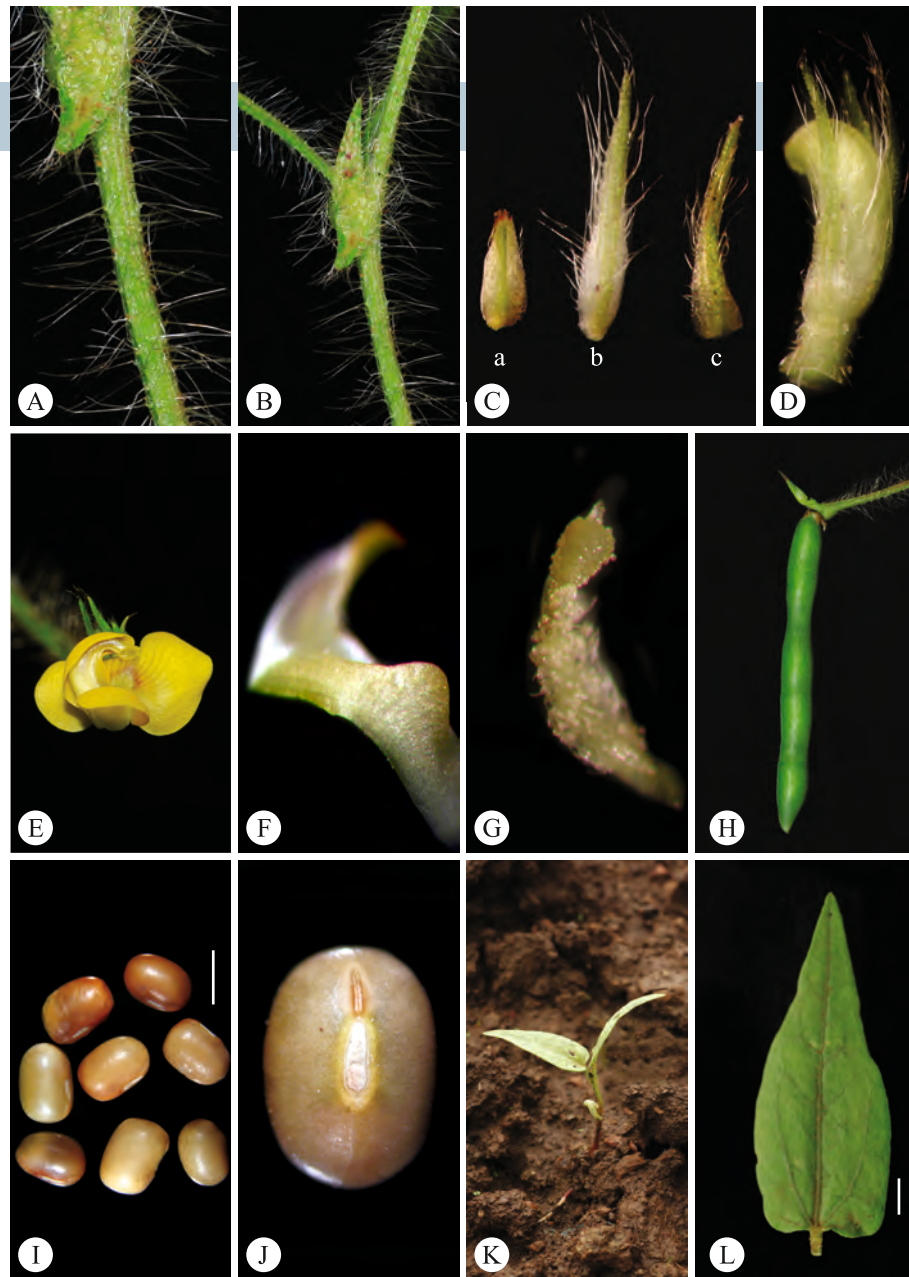


* Added by Tomooka *et al.* (2002)

Diagnostic characters in identification of *Vigna* species are the size and form of stipule, flower colour (various shades of yellow), keel pocket size, stigma beak length and shape, number; orientation and surface characters of pod in an inflorescence, seeds per pod, seed size, shape, surface details and aril development and seedling morphology.

Key to species of genus *Vigna* in India

1. Stipules basifixed.....2
1. Stipules peltate or submedifixed.....4
2. Plants with tuberous rootstock.....3
2. Plants without tuberous rootstock, flowers yellow.....*V. marina*
3. Pods recurved, laterally compressed, pale brown when mature.....
.....*V. adenantha*
3. Pods straight, linear, dark brown to black when mature...*V. vexillata*
4. Stipules ovate.....5
4. Stipules elliptic or elliptic ovate.....11
5. Leaflets lobed.....6
5. Leaflets not lobed.....9
6. Erect herb with large foliaceous stipule.....*V. khandalensis*
6. Trailing herbs, stipules not foliaceous.....7
7. Seeds rough with reticulate surface, aril absent.....*V. indica*
7. Seeds smooth, aril present.....8
8. Mature pod covered with brown hairs, seeds black.....*V. stipulacea*
8. Mature pod glabrous, seeds orange yellow.....*V. trilobata*
9. Flowers pale yellow (rarely greenish yellow), pods 1-3 per inflorescence with white or yellowish white hairs...*V. subramaniana*
9. Flowers greenish yellow, pods 4-8 per inflorescence with ferruginous hairs at maturity10
10. Plants erect, cultivated, seeds green or yellowish brown, shiny with smooth surface.....*V. radiata*
10. Plants trailing or twining, seeds brown-black, rough with reticulate surface.....*V. sublobata*
11. Seeds with smooth surface.....12
11. Seeds with rough surface.....19
12. Flowers bluish or pinkish purple.....*V. unguiculata*
12. Flowers yellow.....13
13. Plants cultivated.....14
13. Plants wild.....16
14. Plants trailing.....*V. aconitifolia*
14. Plants erect.....16
15. Seeds black.....*V. glabrescence*
15. Seeds red or pale yellow.....*V. angularis*
16. Plants trailing, pods 1-3 per inflorescence, seeds 1-3 per pod.....*V. hosei*
16. Plants trailing or twining, pods more than 3 per inflorescence, seeds more than 3 per pod.....17
17. Style beak flat.....*V. dalzelliana*
17. Style beak linear.....18
18. Seeds large, pale yellow or pale brown.....*V. umbellata* (Cult.)
18. Seeds small, black or dark brown.....*V. umbellata* (Wild)
19. Plants erect, cultivated, pod 4-6 seeded.....*V. mungo*
19. Plants twinners, wild, pod with more than 6 pod.....20
20. Aril absent or very poorly developed.....21
20. Aril well developed.....23
21. Leaflets velvety, flowers small, pods covered with very conspicuous white hairs at maturity.....*V. hainiana*
21. Leaflets not as above, flowers large, pods covered with brown hairs at maturity.....22
22. Standard smaller 11 x 17.5 cm, stem densely covered with 2 mm long brown hairs.....*V. trinervea* var. *trinervea*
22. Standard larger 13 x 21 cm, stem densely covered with 1 mm long brown hairs.....*V. trinervea* var. *bourneae*
23. Pods 7-12 per inflorescence, pod 10-15 seeded, seeds rectangular.....*V. sahyadriana*
23. Pods 6-8 per inflorescence, pod 6-8 seeded, seeds round*V. silvestris*



Vigna aconitifolia (Jacq.) Marechal (Cultivated) A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

***V. aconitifolia* (Jacq.) Marechal (Cultivated)**

Erect to semi erect herb. Stems 200 cm long, densely covered with 2-3 mm long white hairs. Leaves 3-foliolate, terminal leaflet deeply 5 lobed, lateral leaflets deeply 4 lobed. Stipules subulate, submedifixed, 10-12 x 2-2.2 mm. Inflorescence axillary, 6-8 flowered; flowers bright yellow, 6 - 6.5 mm in diam. Pods linear, cylindrical, glabrescent, 4-4.5 x 0.3-0.35 cm, buff or pale brown colored when mature. Seeds elliptic, 8-9 per pod, smooth, pale brown, 4 x 2.5 x 2 mm, aril not developed.

Flowering and fruiting: September to November

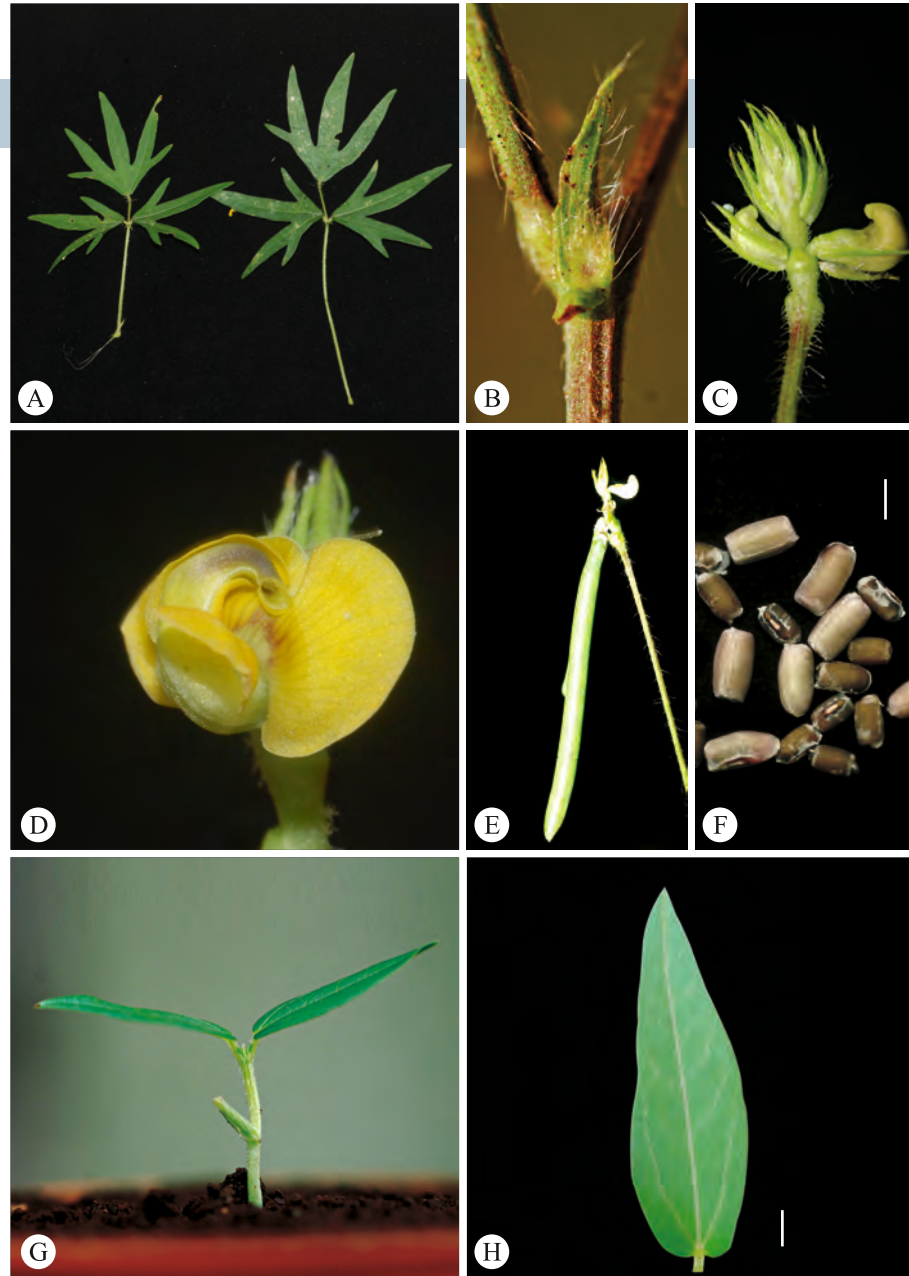
Distribution: Australia, Costa Rica, India, Pakistan, and Sri Lanka.

India: Andhra Pradesh, Bihar, Karnataka, Maharashtra, Punjab, Rajasthan, Uttaranchal and Uttar Pradesh.

Field notes: This species can be identified by its dissected or 4-5-lobed leaflets.

Chromosome number: $2n = 22$





Vigna aconitifolia (Jacq.) Marechal (Wild) A. Leaf variation, B. Stipule, C. Bud, D. Flower, E. Pod, F. Seed, G. Seedling and H. First leaf. Scale bar 3 mm

***V. aconitifolia* (Jacq.) Marechal (Wild)**

Decumbent herb. Stems 200 cm long, densely covered with 2-3 mm long white hairs. Leaves 3-foliolate, terminal leaflet deeply 5 lobed, lateral leaflets deeply 4 lobed. Stipules subulate, submedifixed, 9-11 x 2-2.2 mm. Inflorescence axillary, 5-7 flowered; flowers bright yellow, 6.5-7 mm in diam. Pods linear, cylindrical, glabrescent, 3.8-4.3 x 0.3-0.35 cm buff or pale brown colored when mature. Seeds elliptic, 5-7 per pod, smooth, pale brown, 4.5 x 2.3 x 2 mm, aril not developed.

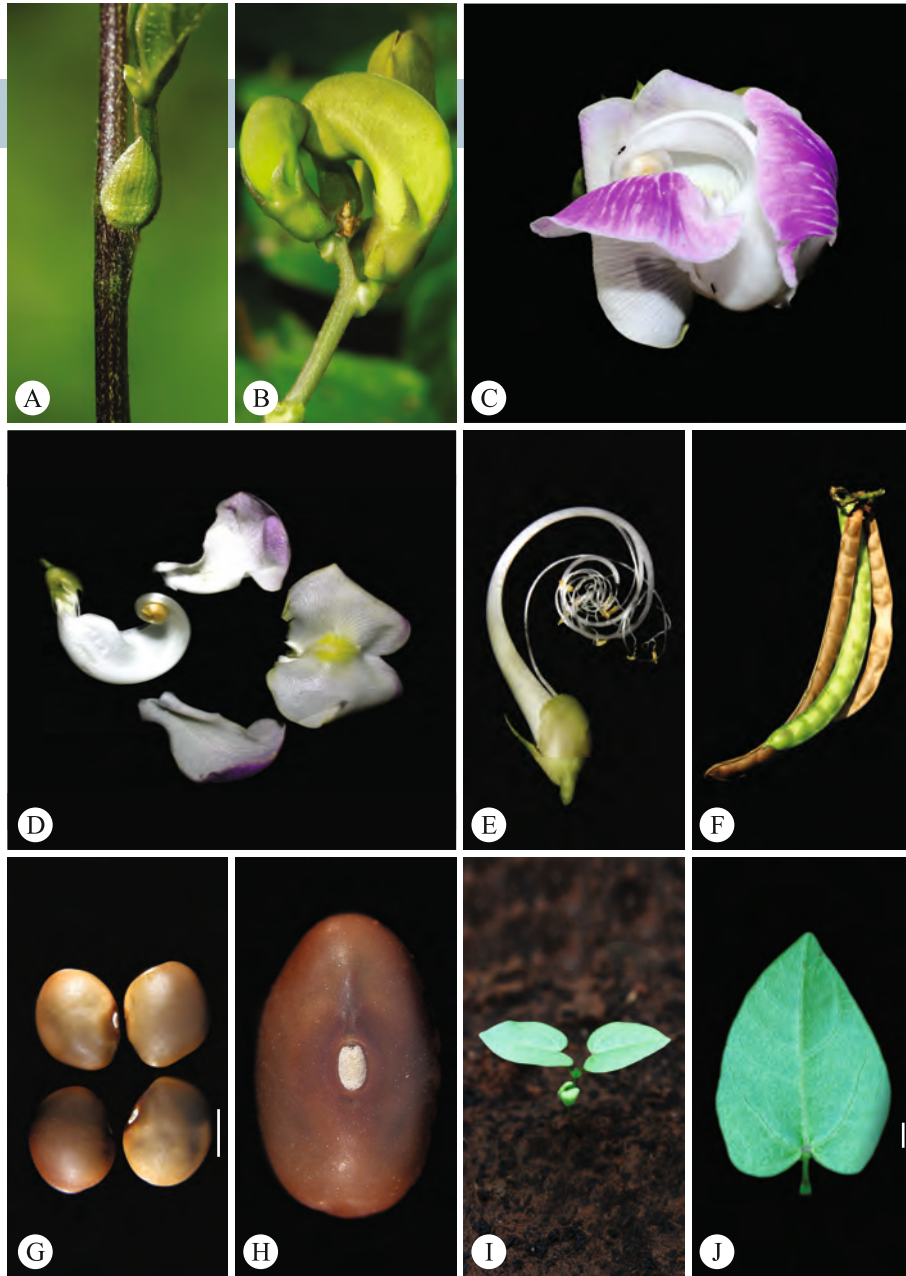
Flowering and fruiting: September to November

Distribution: India: Maharashtra, Orissa, Rajasthan and Eastern India.

Field notes: Found along roadside and on bunds of fields. Easily distinguished by its dissected or 4-5-lobed linear leaflets.

Chromosome number: $2n = 22$





Vigna adenantha (G. F. Meyer) Marechal *et al.* A. Stipule, B. Bud, C. Flower, D. Parts of flower E. Staminal tube, F. Pod, G & H. Seed, I. Seedling and J. First leaf. Scale bar 3 mm

V. adenantha (G. F. Meyer) Maréchal, Mascherpa & Stainier

Twinning or trailing perennial herb, rootstock tuberous. Stem 250-300 cm long, glabrous. Leaves 3-foliolate, shiny, terminal leaflet ovate, lateral leaflets obliquely ovate. Stipules ovate or triangular, basifixed. Inflorescence 10-15 flowered; flowers pinkish violet, 30-31 mm in diam. Pods curved, laterally compressed, glabrous, 12-15 x 1-1.2 cm, buff or pale brown when mature. Seeds rounded, 10-15 per pod, smooth, shiny, grey, 8 x 7.5 x 5.5 mm, aril not developed.

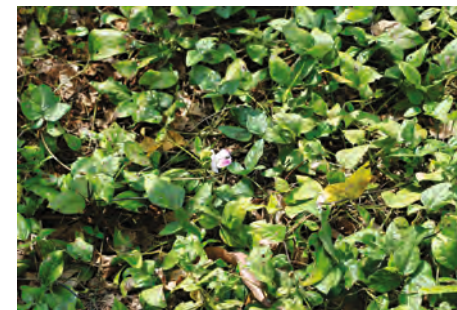
Flowering and fruiting: September to November

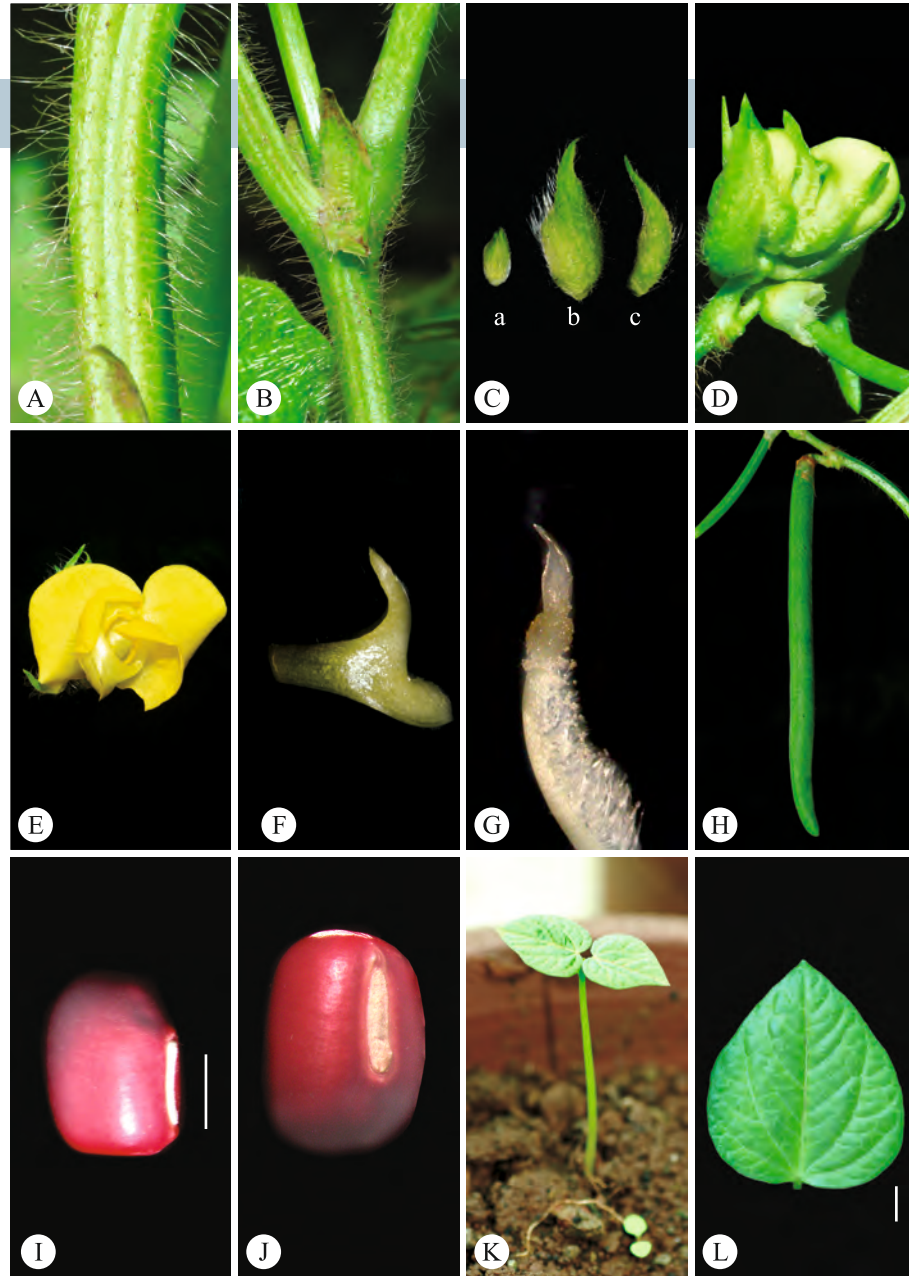
Distribution: Native of South Africa, naturalized and often cultivated in India.

India: Andaman Islands, Bihar, Madhya Pradesh, Orissa, Tamil Nadu and West Bengal.

Field notes: Found along roadsides in waste places. It is an excellent soil conservation crop.

Chromosome number: $2n=22$





Vigna angularis (Willd.) Ohwi & Ohashi A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

V. angularis (Willd.) Ohwi & Ohashi

Erect herb. Stem 70-90 cm long, sparsely to densely covered with 1.8 - 2 mm long white hairs. Leaves 3-foliolate, terminal leaflet ovate to rhomboidal, lateral leaflets obliquely ovate. Stipules narrowly elliptic, medifixed, 13-17 x 3-4 mm. Inflorescence 6-10 flowered; flowers golden yellow, 22-23 mm in diam. Pods linear cylindrical, glabrous, blackish when mature, 6-6.3 x 0.4-0.5 cm. Seeds oblong, 7-8 per pod, smooth, reddish or pale yellow, 7.5 x 5.5 x 5 mm, aril not developed.

Flowering and fruiting: August to November

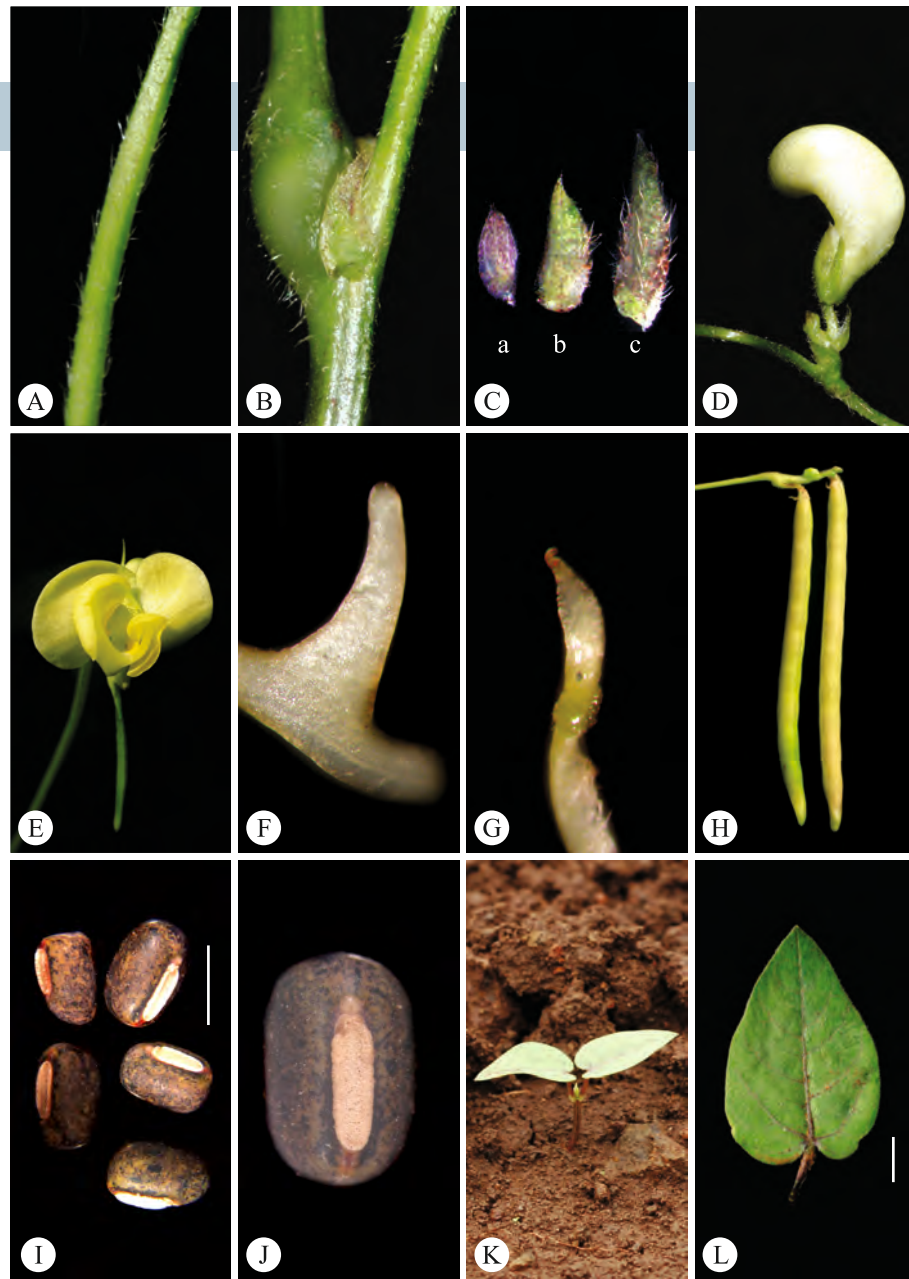
Distribution: It is traditionally cultivated in East Asia and northeastern Vietnam. It seems to be ancient crop in Nepal and Bhutan, also reported from Australia, China, Japan and North America. Cultivated in limited scale in hilly areas of India.

India: Assam, Sikkim Tamil, Nadu and Uttar Pradesh.

Field notes: Cultivated and commonly known as Adzuki Bean.

Chromosome number: $2n = 22$





Vigna dalzelliana (Kuntze) Verdcourt A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

***V. dalzelliana* (Kuntze) Verdcourt**

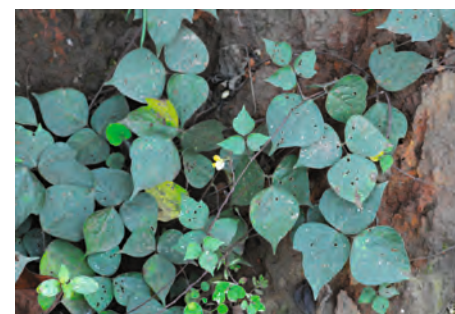
Prostrate or trailing or twinning herb. Leaves 3-foliolate, terminal leaflet ovate, lateral leaflets obliquely ovate. Stipules elliptic ovate, medifixed, 4-4.2 x 1.2-1.3 mm. Inflorescence 5-6 flowered; flowers pale yellow, 11-12 mm in diam. Pods linear, cylindrical and glabrescent, buff or grayish black colored when mature, 4-4.2 x 0.3-0.35 cm. Seeds rectangular, 9-13 per pod, smooth, shiny, grey mottled, 3 x 2 x 1.6 mm, aril well developed.

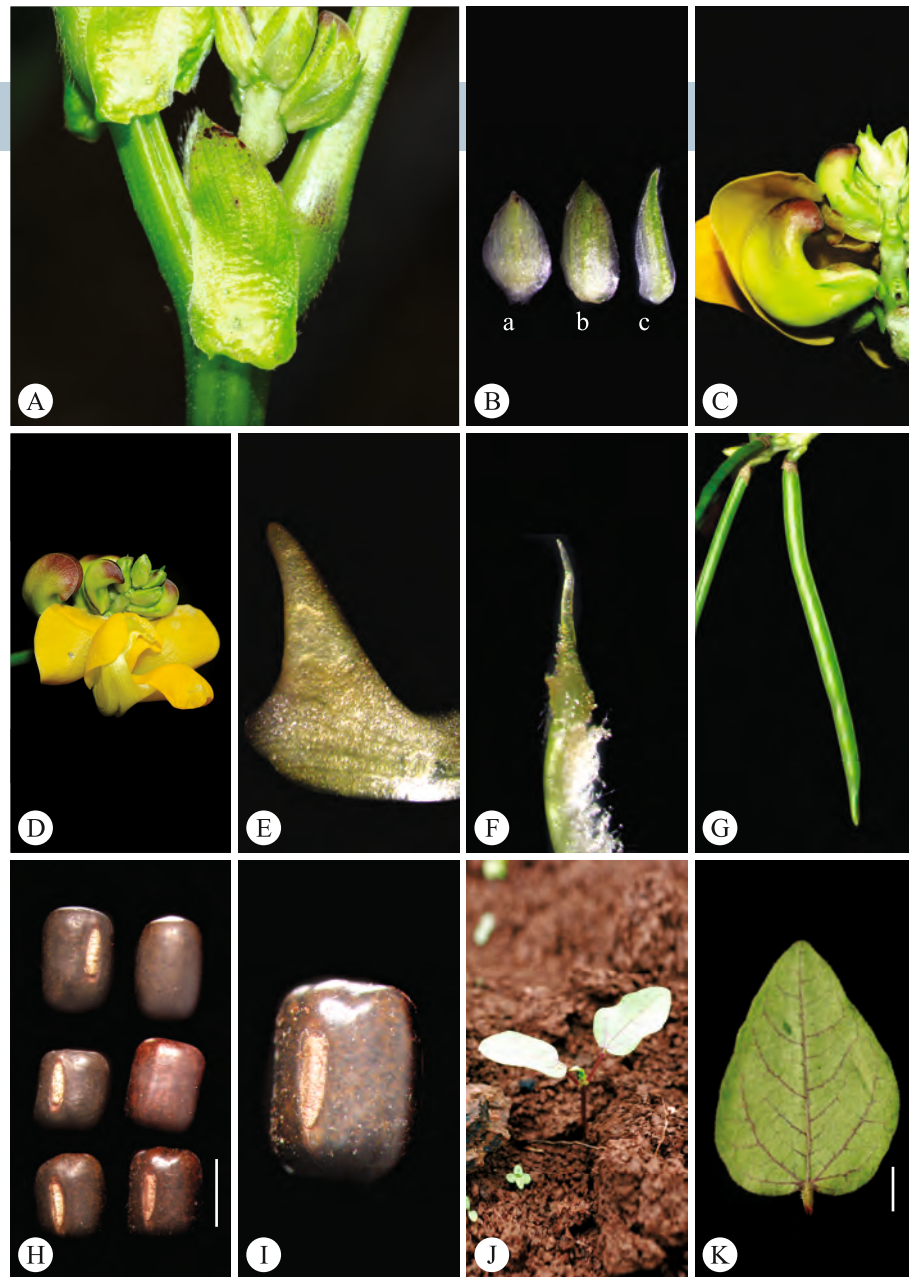
Flowering and fruiting: September to December

Distribution: Cambodia, India, Philippines, Sri Lanka, Thailand and Vietnam.
India: Maharashtra, Karnataka, Kerala, Rajasthan, Tamil Nadu, Orissa, Madhya Pradesh and Bihar.

Field notes: Rooting at nodes. Plants trailing on ground produce cleistogamous subterranean flowers. Forms a component of the ground flora of Monsoon vegetation in forest areas. It grows in places along road side. It resembles with wild form of *V. umbellata*, but can be distinguished by its flat beak.

Chromosome number: 2n = 22





Vigna glabrescens Marechal *et al.* A. Stipule, B. Primary bract (a); Secondary bract (b); Bracteole (c), C. Bud, D. Flower, E. Keel pocket, F. Beak, G. Pod, H & I. Seed, J. Seedling and K. First leaf. Scale bar 3 mm

***V. glabrescens* Marechal Mascherpa & Stainier**

Erect herb. Stem 50 - 70 cm long, glabrous. Leaves 3-foliolate, terminal leaflet narrowly ovate, lateral leaflets obliquely ovate. Stipule obliquely ovate, medifixed, 12-14 x 5-6 mm. Inflorescence 10-20 flowered; flowers golden yellow, 18-20 mm in diam. Pods linear, cylindrical, glabrous, blackish when mature, 9-9.5 x 0.4-0.6 cm. Seeds rectangular, 10-14 per pod, smooth, dark brown to black, 5 x 3.5 x 3.3 mm, aril not developed.

Flowering and fruiting: August to November

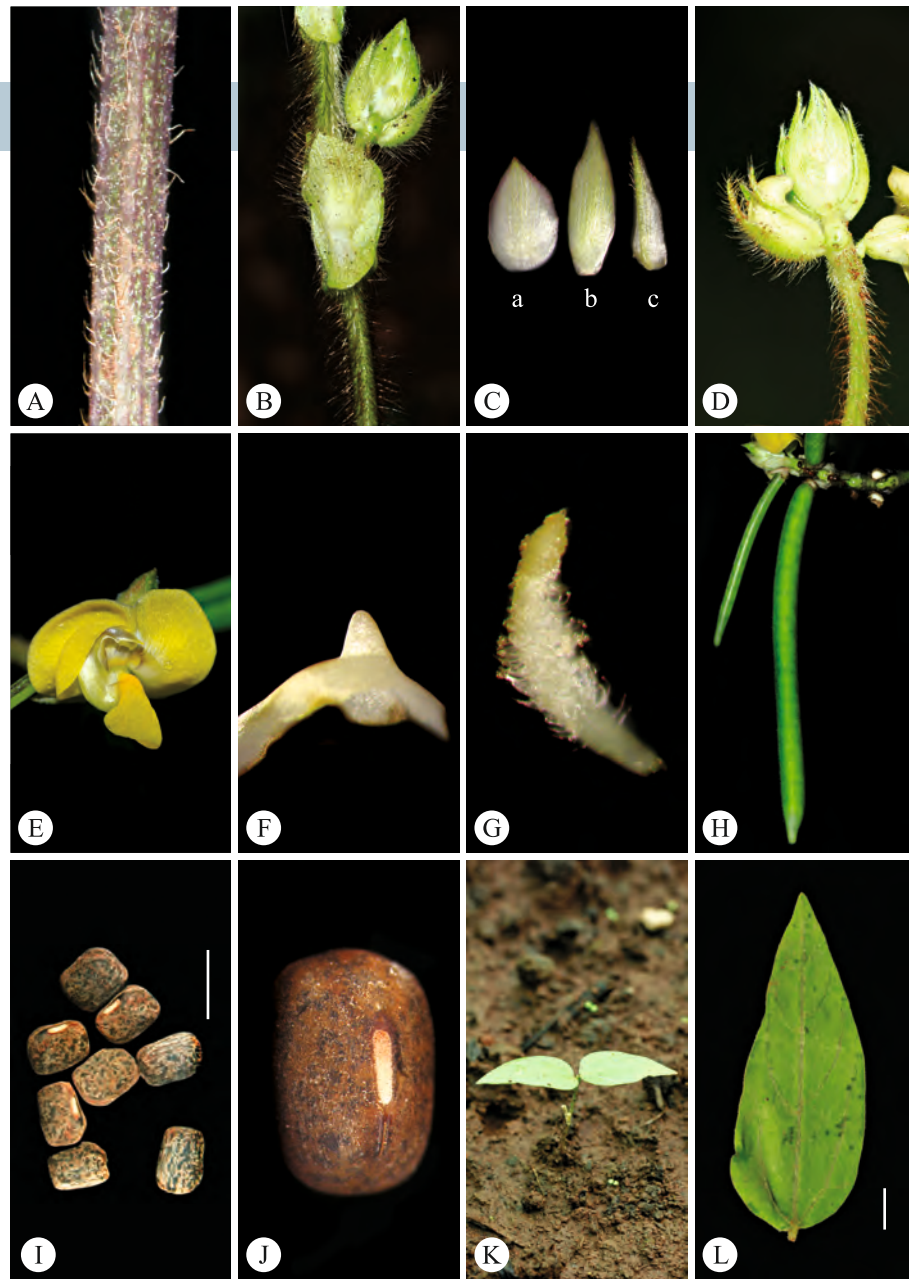
Distribution: India, Japan, Mauritius, Mlingano, Philippines, Tanzania and Vietnam.

India: West Bengal and Orissa.

Field notes: Robust cultivated herb with large golden yellow flowers.

Chromosome number: 2n = 44





Vigna hainiana Babu *et al.* A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

V. hainiana Babu, Gopinathan & S. K. Sharma

Twinning herb. Stem, 250-300 cm long, densely covered with 3-3.5 mm long, brown hairs. Leaves 3-foliolate, terminal leaflet ovate, lateral leaflets obliquely ovate. Stipule elliptic ovate, medifixed, 1.3-1.6 x 0.6-0.8 mm. Inflorescence 6-8 flowered, flowers yellow, 10.5-11 mm in diam. Pods linear, cylindrical, densely covered with small white hairs, 4-4.5 x 0.3-0.35 cm, blackish when mature. Seeds oblong, 9-10 per pod, rough, blackish grey or brown, 2.5 x 2 x 1.8 mm, aril not developed.

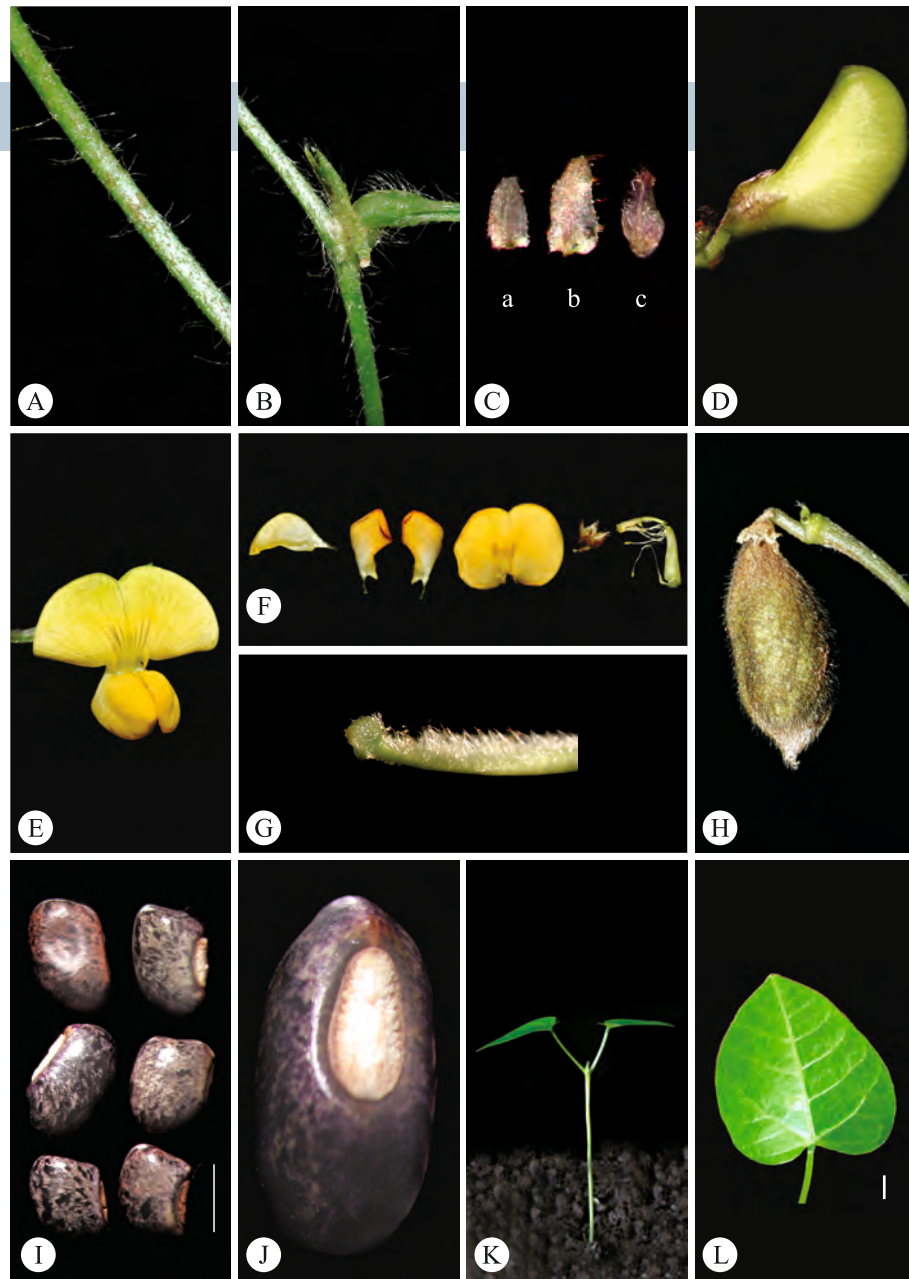
Flowering and fruiting: September to November

Distribution: India: Assam, Bihar, Chhattisgarh, Himachal Pradesh, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Uttaranchal, Uttar Pradesh and West Bengal.

Field notes: A remarkable forest dwelling species found as undergrowth in forest areas. Velvety leaves and small golden yellow flowers are diagnostic characters of the species.

Chromosome number: $2n = 22$.





Vigna hosei (Craib) Backer A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Flower parts, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

***V. hosei* (Craib) Backer**

Creeping herb. Stem 300-350 cm long, sparsely covered with 0.7 mm long, brown hairs. Leaves 3-foliolate, terminal leaflet elliptic ovate, lateral leaflets obliquely ovate. Stipule ovate to triangular, 4-4.2 x 1.5-1.7 mm, basally fixed. Inflorescence 3-4 flowered; flowers golden yellow, 9.5-10 mm in diam. Pods cylindrical, finely pubescent, 1.5-1.8 x 0.4-0.5 cm, pale brown when mature. Seeds obliquely rectangular or elliptic, usually 2 per pod, smooth, shiny, mottled grey or black, 5.5 x 3.2 x 3 mm, aril developed.

Flowering and fruiting: November to February

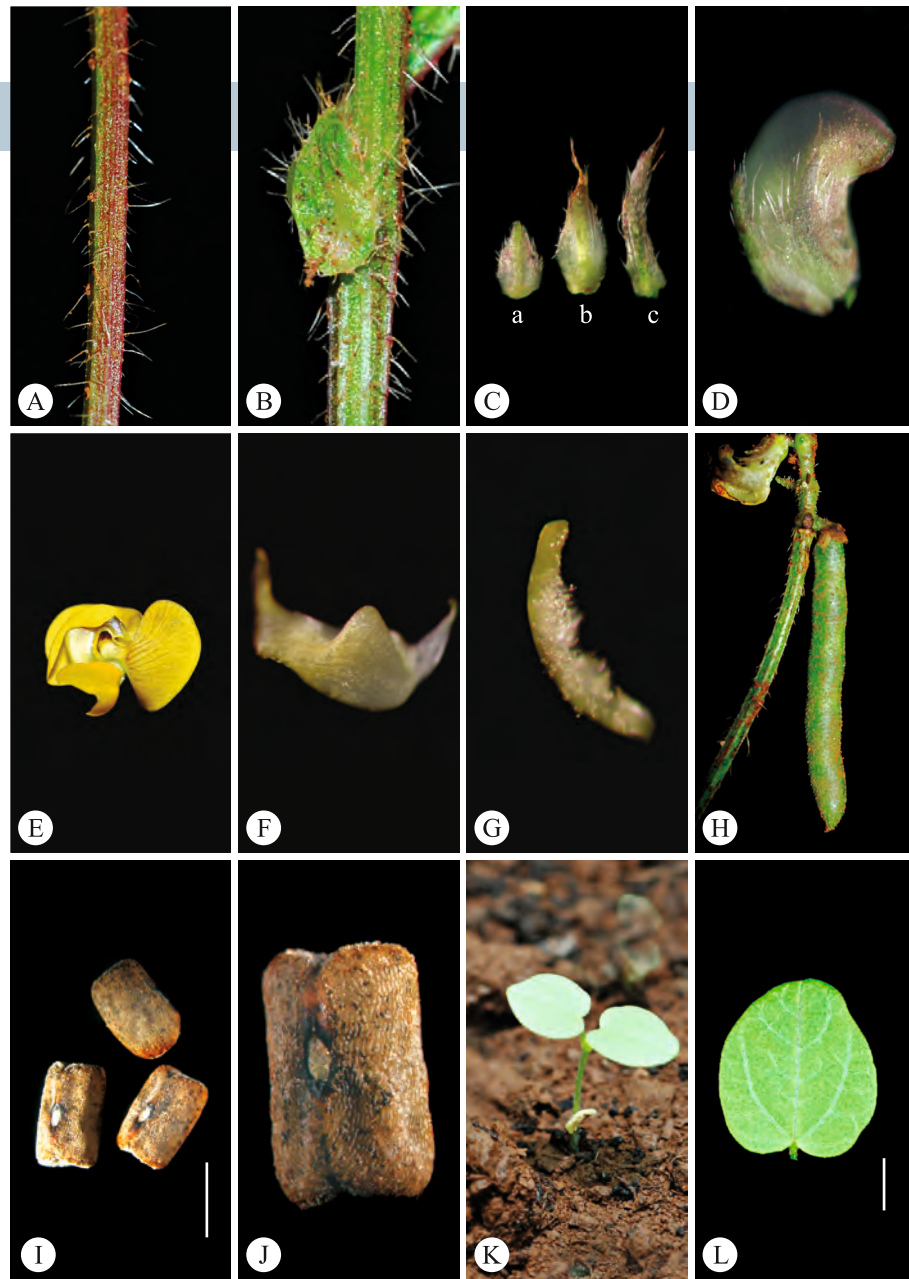
Distribution: Native of N. Borneo, introduced in India, Indonesia, Malaysia, Mozambique, Sri Lanka and Tanzania.

India: Kerala and Orissa.

Field notes: It grows as escape along roadsides. Stem rooting at node. In the genus, it is the only species usually with 2 seeded pod.

Chromosome number: 2n = 22





Vigna indica Dixit *et al.* A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

V. indica Dixit, K. V. Bhat & S. R. Yadav

Perennial trailing herb. Stem 90-150 cm long, sparsely to densely covered with 0.5-1.5 mm long white hairs. Leaves 3-foliolate, terminal leaflet ovate to rhomboid with 3-5, deep to shallow spatulate lobes or nearly entire, lateral leaflets somewhat oblique with 3-5 spatulate lobes or entire. Stipules ovate to lanceolate, medifixed, 3.3-8 x 1.2-1.8 mm. Inflorescence 5-10 flowered; flowers pale yellow with purplish keel tip, 5.8-6 mm in diam. Pod linear, cylindrical, finely pubescent, 1.5-3.8 x 0.2-0.3 cm, buff or pale brown colored when mature. Seeds rectangular, 4-7 per pod, rough, brown to maroon, 4 x 2.1 x 2.1 mm, aril not developed.

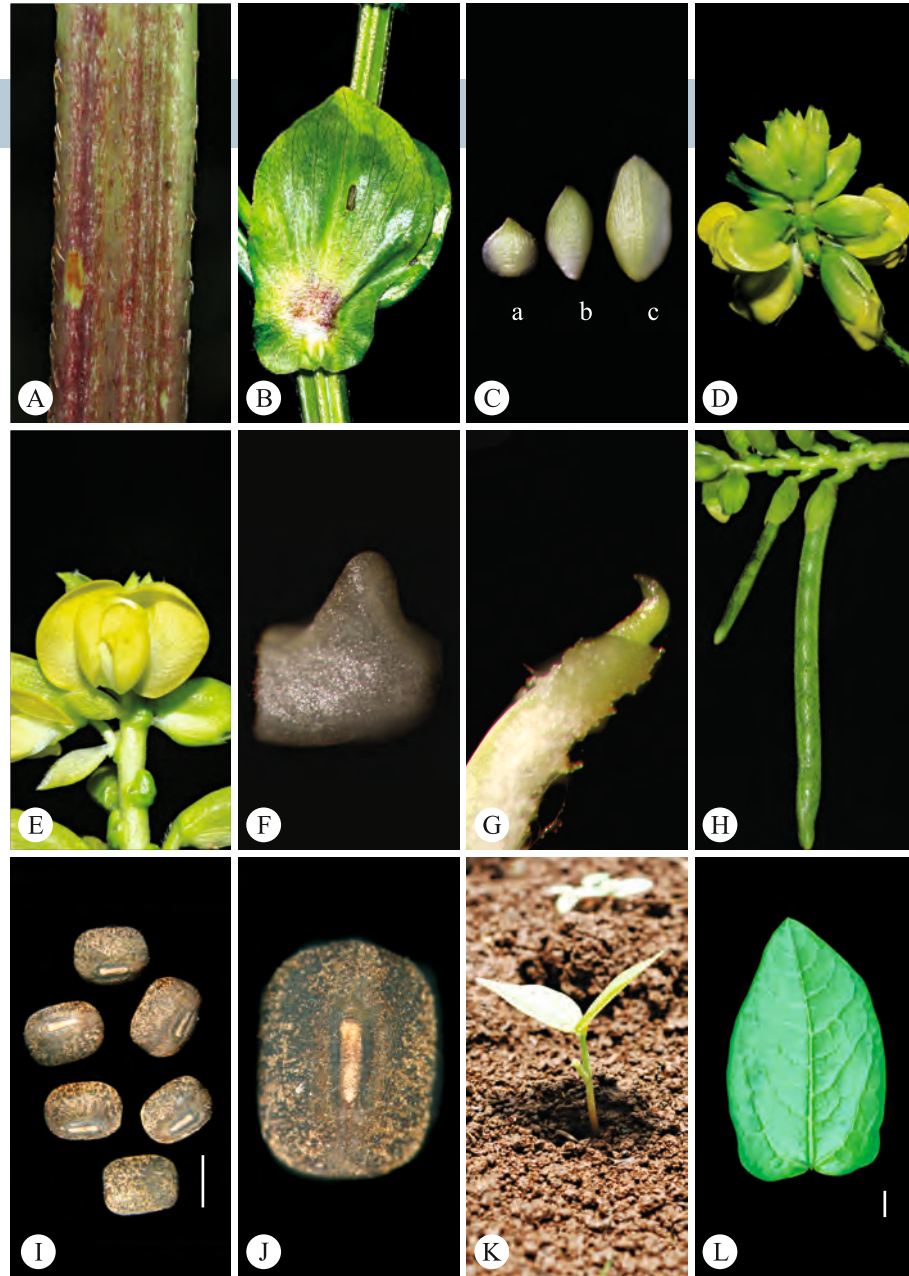
Flowering and fruiting: July to October

Distribution: India: Gujarat, Karnataka, Maharashtra, Madhya Pradesh and Rajasthan.

Field notes: This species can be identified on the basis of reticulate rough adherent perisperm of seed and aril not developed.

Chromosome number: $2n = 22$





Vigna khandalensis (Santapau) Raghavan & Wadhwa A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

V. khandalensis (Santapau) Raghavan & Wadhwa

Erect robust herb. Stem angular, 150-200 cm long; ridges sparsely covered with 0.8-1 mm long yellowish white hairs. Leaves 3-foliolate, terminal leaflets 3 lobed, lateral leaflets 2-3 lobed. Stipule broadly ovate, medifixed, 3.6-4.7 x 2.4-3.5 cm. Inflorescence 4-10 flowered; flowers creamy or greenish yellow, 1.3-1.4 mm in diam. Pods linear, cylindrical and densely pubescent, 6-6.5 x 0.35-0.4 cm, blackish when mature. Seeds rounded, 10-12 seeds per pod, rough, 4.5 x 3.7 x 3.5 mm, aril not developed.

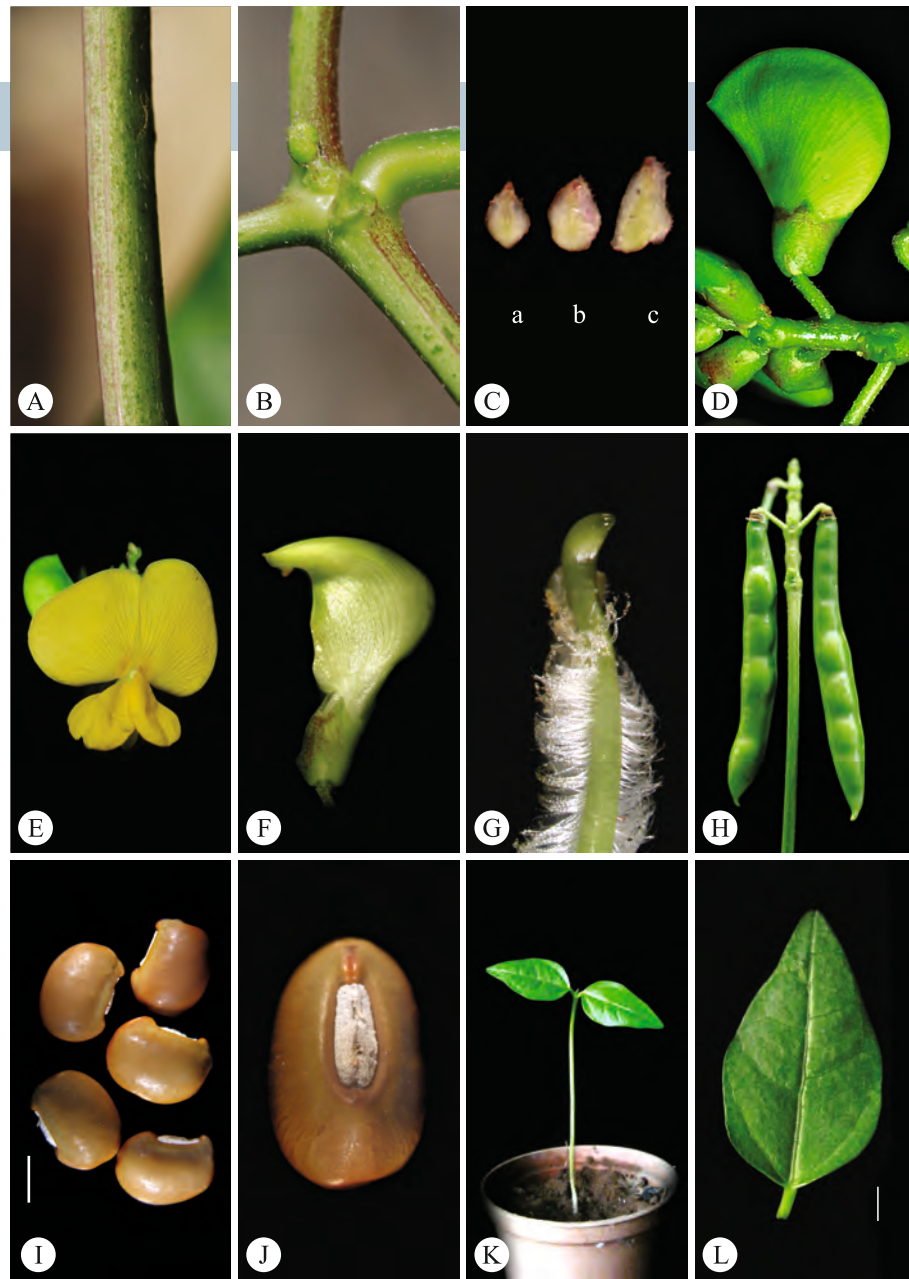
Flowering and fruiting: September to November

Distribution: India: Maharashtra. **Endemic.**

Field notes: A remarkable species in the genus having shrubby appearance, deeply lobed leaflets, conspicuous-foliaceous stipule and boat shaped bracts.

Chromosome number: $2n = 22$





Vigna marina (Burm.) Merr. A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel petal, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

***V. marina* (Burm.) Merr.**

Twinning herb, glabrescent. Stem 350-400 cm long, sparsely covered with 0.6 mm long white hairs. Leaves 3-foliolate, terminal leaflet elliptic ovate, lateral leaflets slightly obliquely ovate. Stipules ovate to triangular, basifixed, 2 - 2.5 x 1.2 - 1.4 mm. Inflorescence 10-15 flowered; flowers bright yellow, 20-21 mm in diam. Pods subcompressed, glabrous or sparsely pubescent, 5-6 x 1-1.2 cm, brown when mature. Seeds rounded, 5-8 per pod, smooth, shiny, grayish brown or reddish, 6.5 x 5 x 4.8 mm, aril poorly developed.

Flowering and fruiting: October to March

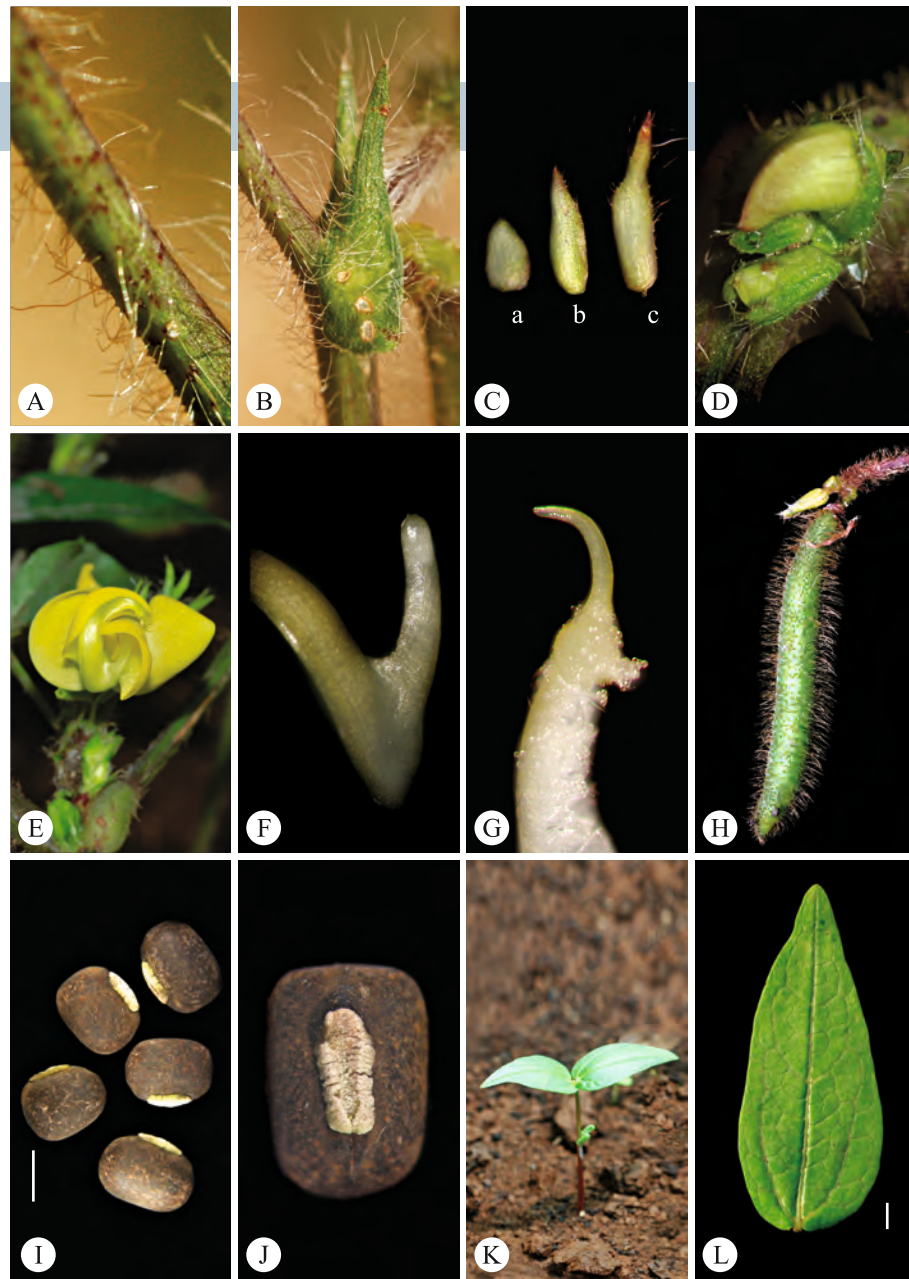
Distribution: Africa, Australia, Burma, Celebes, Fiji, Hawaii, India, Indonesia, Japan, Malaysia, Philippines, Sri Lanka, Tropical America and Vietnam.

India: Andaman Islands and Kerala.

Field notes: Found along sandy coastal tracts. It is robust species with thick stem.

Chromosome number: $2n = 22$





Vigna mungo (L.) Hepper A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

***V. mungo* (L.) Hepper**

An erect cultivated herb. Stem 40 - 80 cm long, sparsely to densely covered with 0.2 mm long white hairs. Leaves 3-foliolate, terminal leaflet rhomboidal, lateral leaflets obliquely ovate. Stipule elliptic lanceolate, medifixed, 12-14 x 3-4 mm. Inflorescence 6-8 flowered; flowers bright yellow, 19-20 mm in diam. Pods linear, cylindrical and densely hairy, 4-5 x 0.6-0.65 cm, dark brown or black when mature. Seeds rounded, 6-12 per pod, rough, usually black, 4.5 x 3.5 x 3.3 mm, aril well developed.

Flowering and fruiting: September to January

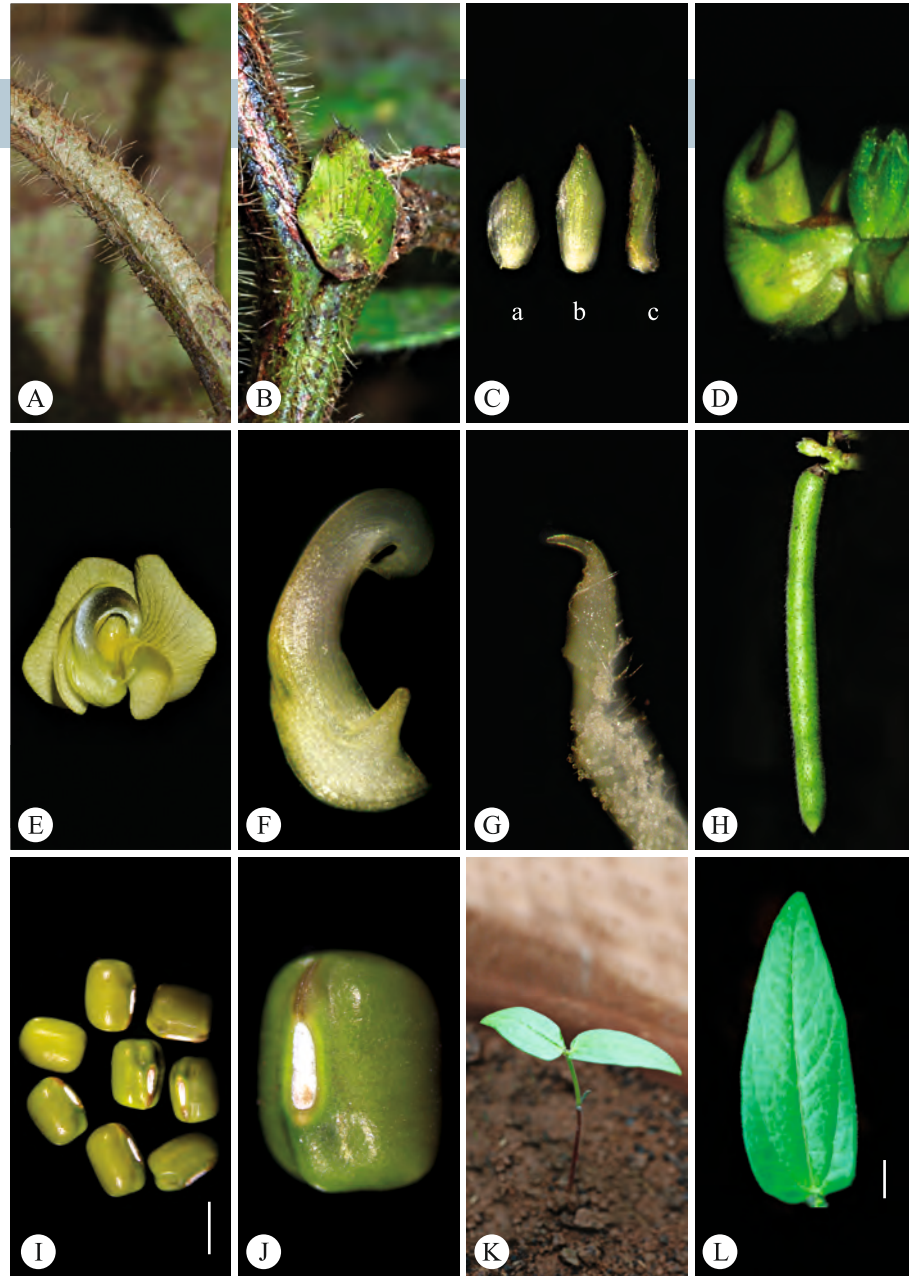
Distribution: Australia, Bangladesh, Ghana, India and Zaire.

India: Maharashtra, Madhya Pradesh, Karnataka, Kerala and Orissa.

Field notes: Cultivated but, sometimes found to be escaped. Escaped form is trailing or twinning.

Chromosome number: 2n = 22.





Vigna radiata (L.) R. Wilczek A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

***V. radiata* (L.) R. Wilczek**

Much branched erect herb. Stem 35-100 cm long, sparsely to densely covered with 0.4-0.6 mm long yellowish white hairs. Leaves 3-foliolate, terminal leaflet narrowly ovate to rhomboidal, lateral leaflets obliquely ovate. Stipule ovate, medifixed, 7-8 x 4-5 mm. Inflorescence 6-10 flowered; flowers greenish yellow, 16-17 mm in diam. Pods linear, cylindrical and densely hairy, 6-6.5 x 0.4-0.45 cm, dark brown or blackish when mature. Seeds rectangular to oblong, 10-14 per pod, smooth, shiny, green or pale brown, 4 x 3.2 x 2.8 mm, aril not developed.

Flowering and fruiting: August to February.

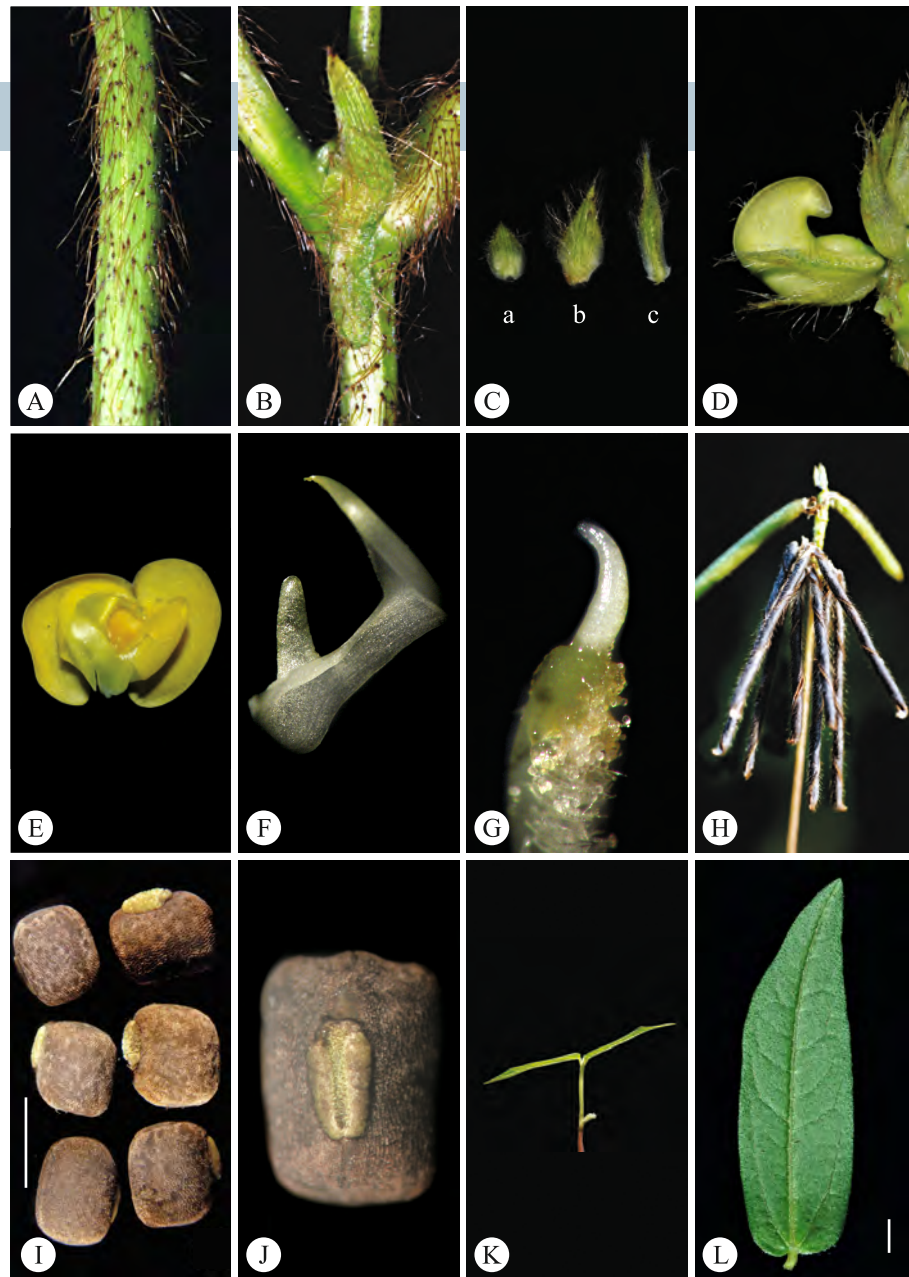
Distribution: Cultivated in India and throughout Tropics.

India: Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Kerala, Maharashtra, Orissa, Tamilnadu and Uttar Pradesh.

Field notes: Cultivated.

Chromosome number: 2n = 22.





Vigna sahyadriana Aitawade *et al.* A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pods, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

V. sahyadriana Aitawade, K. V. Bhat & S. R. Yadav

Twinning herb. Stem 200-300 cm long, densely covered with 3.5 - 4 mm long yellowish brown hairs. Leaves 3-foliolate, terminal leaflet narrowly ovate to rhomboidal, lateral leaflets obliquely ovate. Stipules elliptic, medifixed, 13-15 x 3.5-4.5 mm. Inflorescence 20- 22 flowered; flowers creamy to yellow, 11 - 13 mm in diam. Pods linear, cylindrical and densely hairy, 6-6.5 x 0.4-0.5 cm, brown or black when mature. Seeds rectangular, 10-15 per pod, rough, dark brown to maroon, 3 x 2.5 x 2 mm, aril well developed.

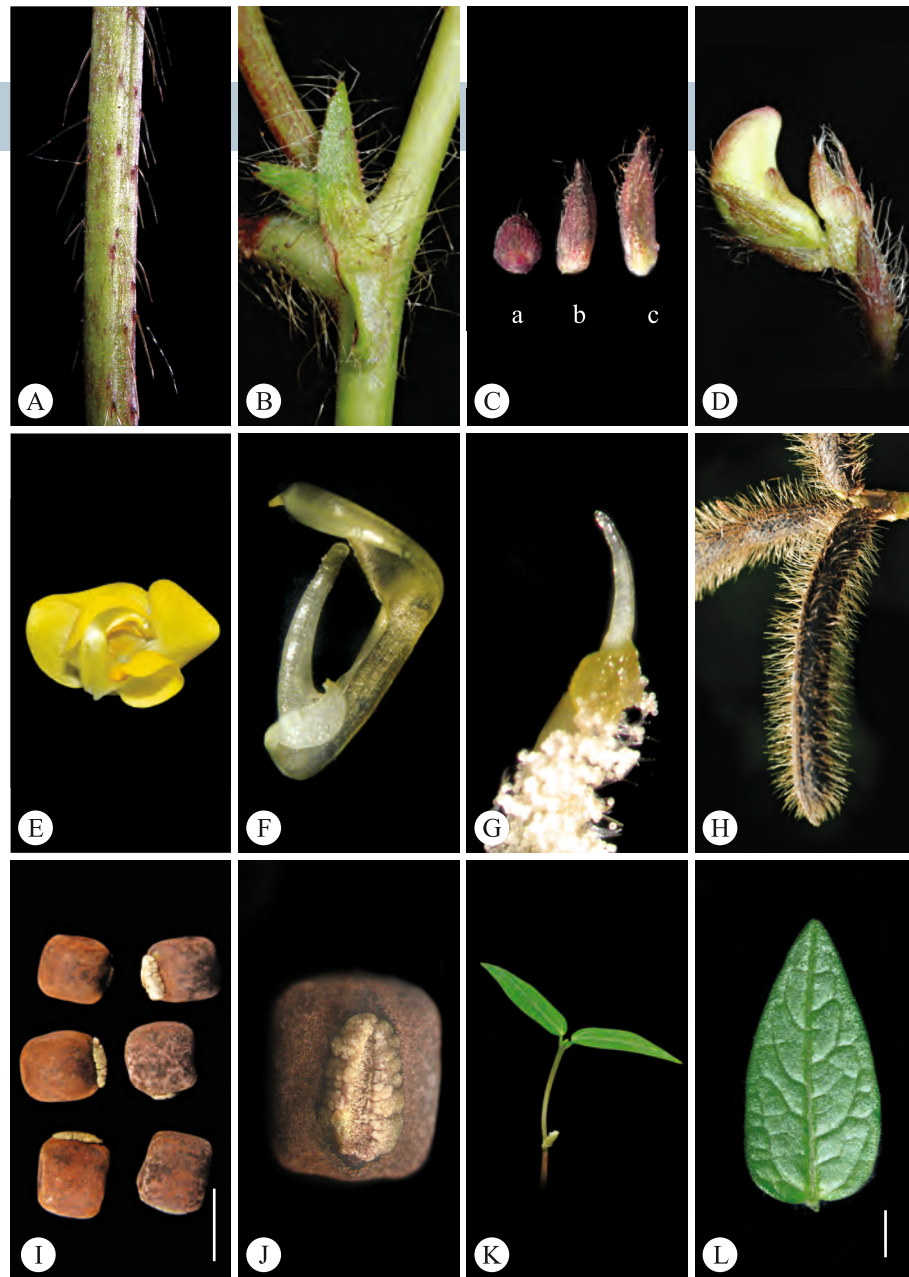
Flowering and fruiting: August to November.

Distribution: India: Northern Western Ghats (Maharashtra).

Field notes: It is similar to *V. silvestris* but differ in 6- 6.5 cm long 10-15 seeded, 7-12 mature pods per inflorescence.

Chromosome number: $2n = 22$.





Vigna silvestris (Lukoki *et al.*) Aitawade *et al.* A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

V. silvestris (Lukoki, Maréchal & Otoul) Aitawade, K. V. Bhat & S. R. Yadav

Twinning herb. Stem 120 - 150 cm long, densely covered with 2.5 mm long yellowish brown hairs. Leaves 3-foliolate, terminal leaflet narrowly ovate to narrowly ovate, lateral leaflets obliquely ovate. Stipule elliptic or rather falcate, medifixed, 8-12 x 5-6 mm. Inflorescence 4-8 flowered; flowers golden yellow, 18-19 mm in diam. Pods linear, cylindrical and densely hairy, 3.7-4.5 x 0.4-0.6 cm, brown to black when mature. Seeds rounded, 6-8 per pod, rough, brown to maroon, 3.2 x 3.1 x 3 mm, aril well developed.

Flowering and fruiting: September to October

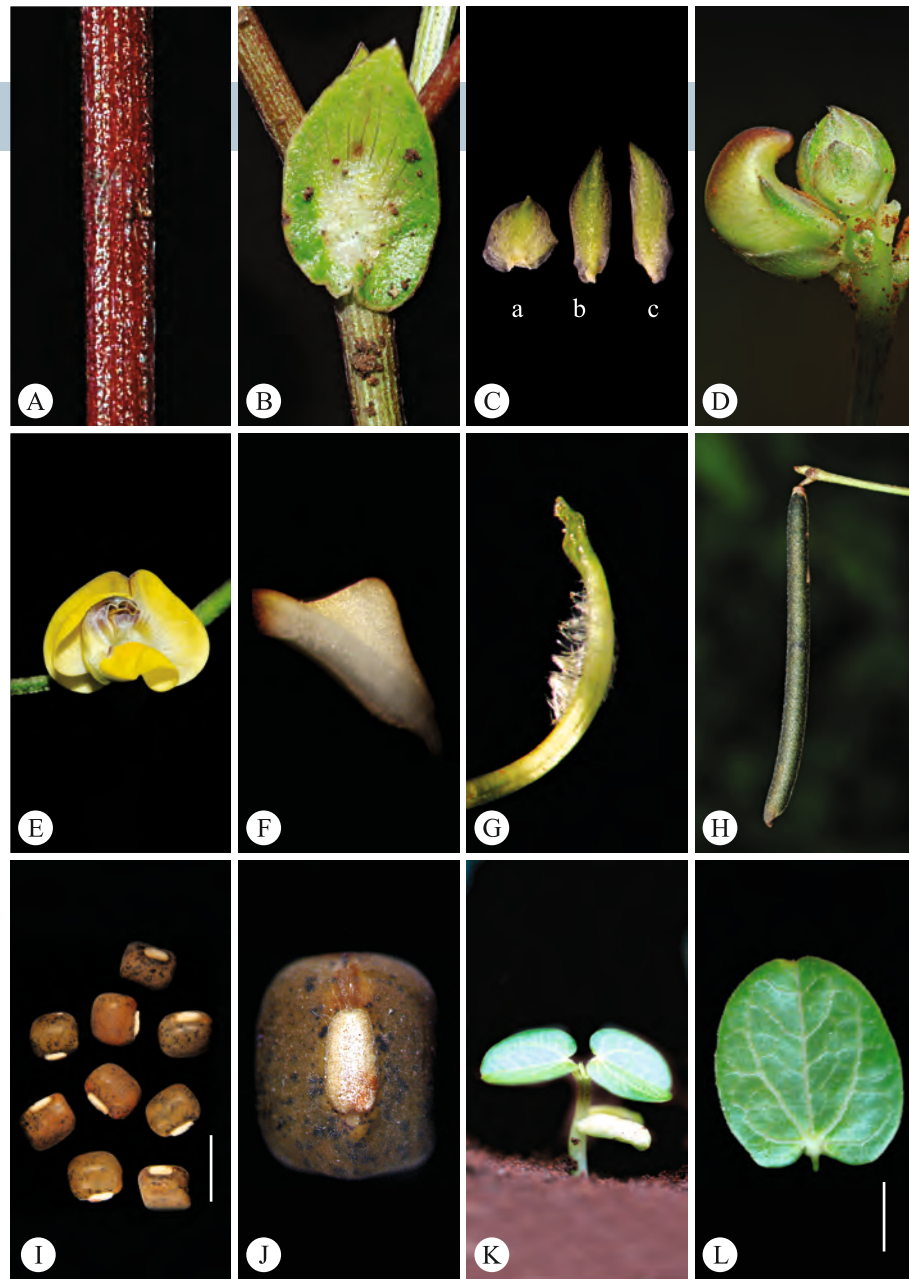
Distribution: India, Myanmar, Thailand.

India: Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan and Tamil Nadu.

Field notes: It is a common species growing in hedges, among bushes in forest areas.

Chromosome number: 2n = 22.





Vigna stipulacea Kuntze A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

V. stipulacea Kuntze

A trailing or twinning herb. Stem 30-120 cm long, sparsely covered with 1 mm long white hairs. Leaves 3-foliolate, terminal leaflet narrowly ovate to rhomboidal, 1-3 lobed or entire, lateral leaflets obliquely ovate, 1-2 lobed or entire. Stipule conspicuously large ovate, medifixed, 8-22 x 1-1.4 mm. Inflorescence 4-12 flowered; flowers shiny yellow, 10-11 mm in diam. Pods linear, cylindrical and sparsely to densely hairy, 4-5 x 0.2-0.3 cm, blackish brown when mature. Seeds elliptic, 10-14 seed per pod, rough fine, brown with small black mottled, 3 x 2 x 1.5 mm, aril slightly developed.

Flowering and fruiting: September to November

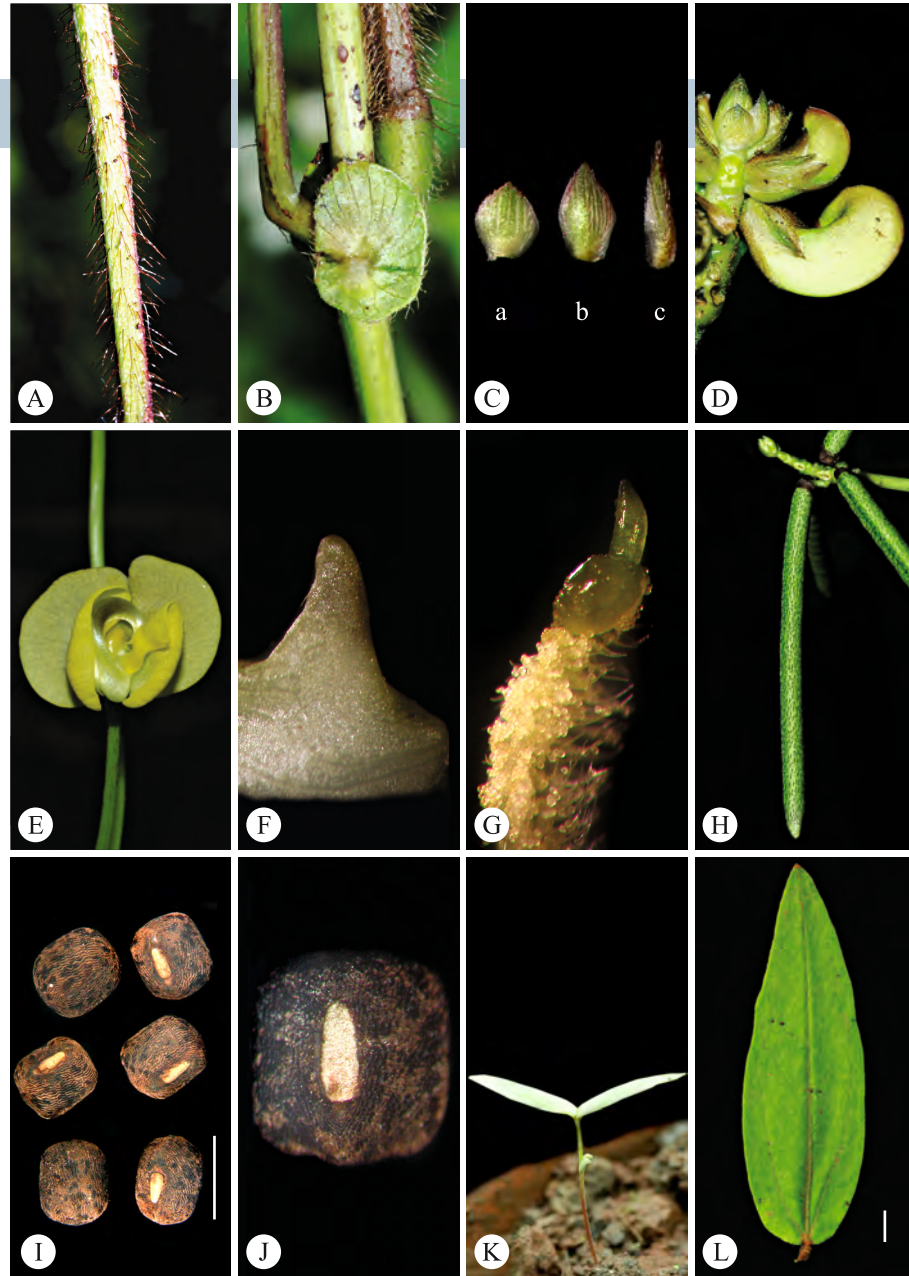
Distribution: Bangladesh, India, Indonesia, Madagascar, Myanmar, Sri Lanka, Vietnam and Yemen.

India: Chhattisgarh, Maharashtra, Madhya Pradesh, Orissa, Rajasthan and Tamil Nadu.

Field notes: Found in open or partially shady habitats, particularly at the edge of paddy as well as in cultivated fields.

Chromosome number: $2n = 22$.





Vigna sublobata (Roxb.) Babu & S. K. Sharma A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

***V. sublobata* (Roxb.) Babu & S. K. Sharma**

A trailing or twining herb. Stem 100-120 cm long, densely covered with 2.5 mm long brown hairs. Leaflets 3-foliolate, terminal leaflet rhomboidal, broadly ovate, lateral leaflets obliquely ovate. Stipules ovate, medifixed, 10-12 x 5-6 mm. Inflorescence 10-12 flowered; flowers greenish yellow with grey keel, 18-19 mm in diam. Pods linear, cylindrical and ferruginously hairy, 6-6.5 x 0.4-0.5 cm, dark brown to blackish when mature. Seeds rectangular, 10-14 per pod, rough, dark brown to maroon, 3 x 2.7 x 2.5 mm, aril not developed.

Flowering and fruiting: September to November

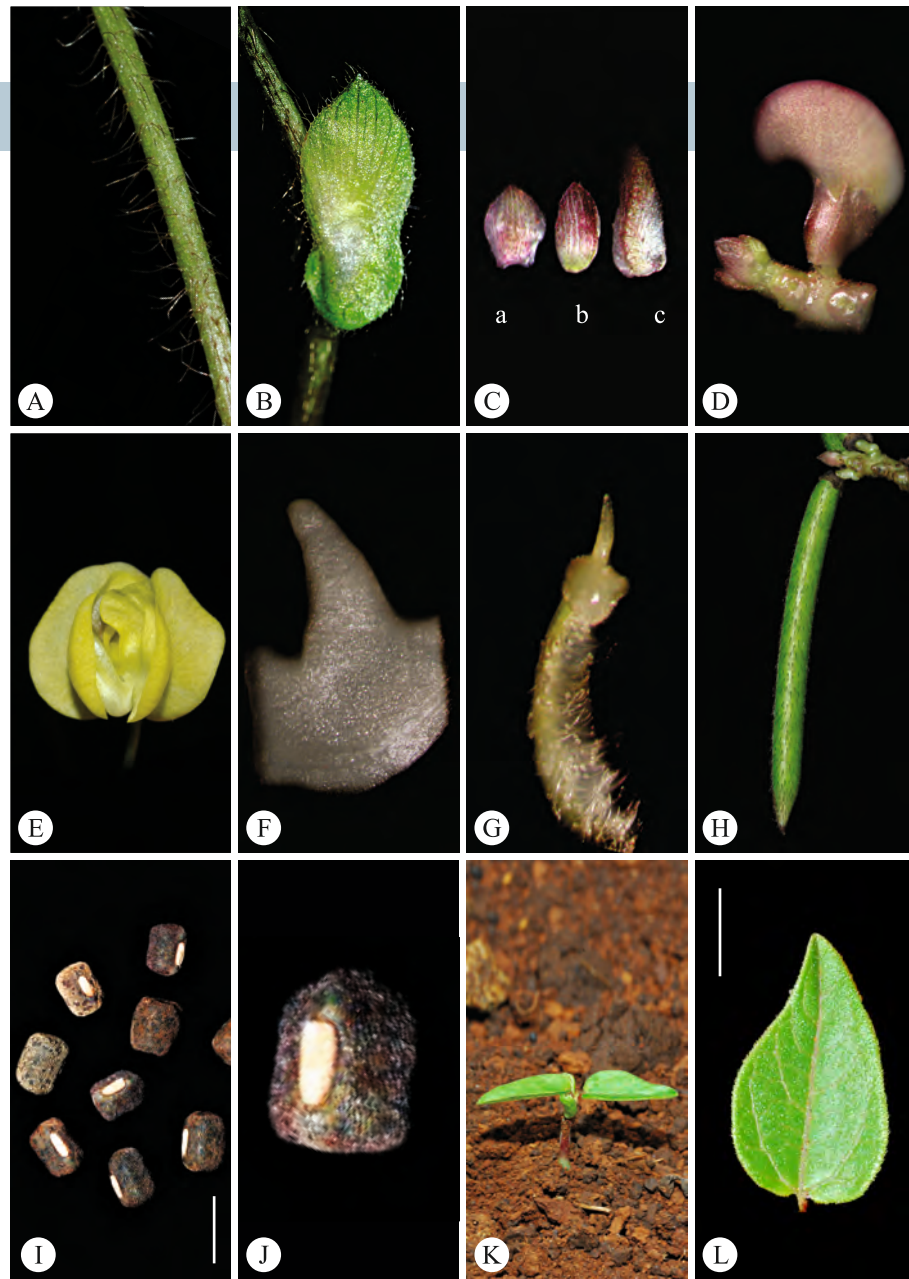
Distribution: India, Malaysia, Throughout Tropics.

India: Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, West Bengal and Tamil Nadu.

Field notes: A species of forest margin and grassland. It is probable progenitor of *V. mungo*.

Chromosome number: 2n = 22.





Vigna subramaniana (Babu ex Raizada) M. Sharma A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

V. subramaniana (Babu ex Raizada) M. Sharma

A twining herb. Stem 100 - 150 cm long, densely covered with 2.5 mm long brown hairs. Leaves 3-foliolate, terminal leaflet narrowly ovate to rhomboidal, lateral leaflets obliquely ovate. Stipules broadly ovate, medifixed, 6-7 x 3.5-4 mm. Inflorescence 6-8 flowered; flowers pale yellow, 13-14 mm in diam. Pods linear, cylindrical and densely pubescent, 4-4.5 x 0.3-0.35 cm, blackish when mature. Seeds rectangular, 10-12 per pod, rough, black, 2.5 x 1.8 x 2 mm, aril not developed.

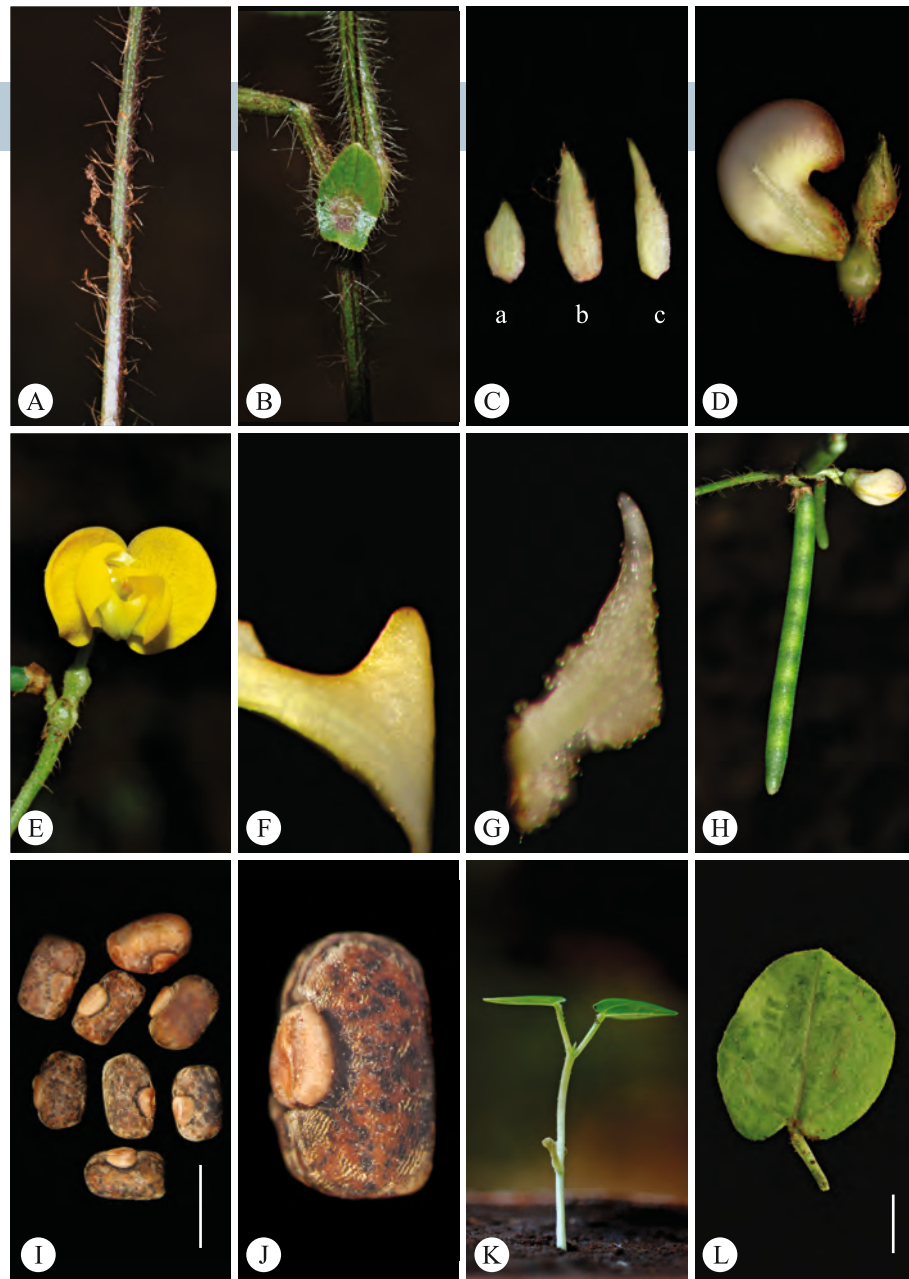
Flowering and fruiting: September to December

Distribution: India: Himachal Pradesh and Kerala.

Field notes: It grows along forest margin and road sides.

Chromosome number: $2n = 22$.





Vigna trilobata (L.) Verdcourt A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

***V. trilobata* (L.) Verdcourt**

A trailing or twinning, straggling annual-perennial herb. Stem 60-80 cm long, densely covered with 1-1.5 mm long white hairs. Leaves 3-foliolate, terminal leaflet narrowly ovate, 3 lobed, lateral leaflets obliquely ovate, 3 lobed. Stipules orbicular to ovate, medifixed, 4-4.2 x 2.2-2.4 mm. Inflorescence 2-6 flowered; flowers golden yellow, 8-10 mm in diam. Pods linear, cylindrical and glabrous or minutely hairy, 2.8-3.2 x 0.18-0.2 cm, buff or pale brown when mature. Seeds rounded or elliptic, 6-10 per pod, rough, orange or brown, 3 x 2 x 2 mm, aril well developed.

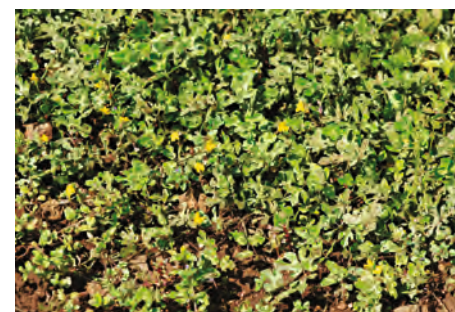
Flowering and fruiting: September to February

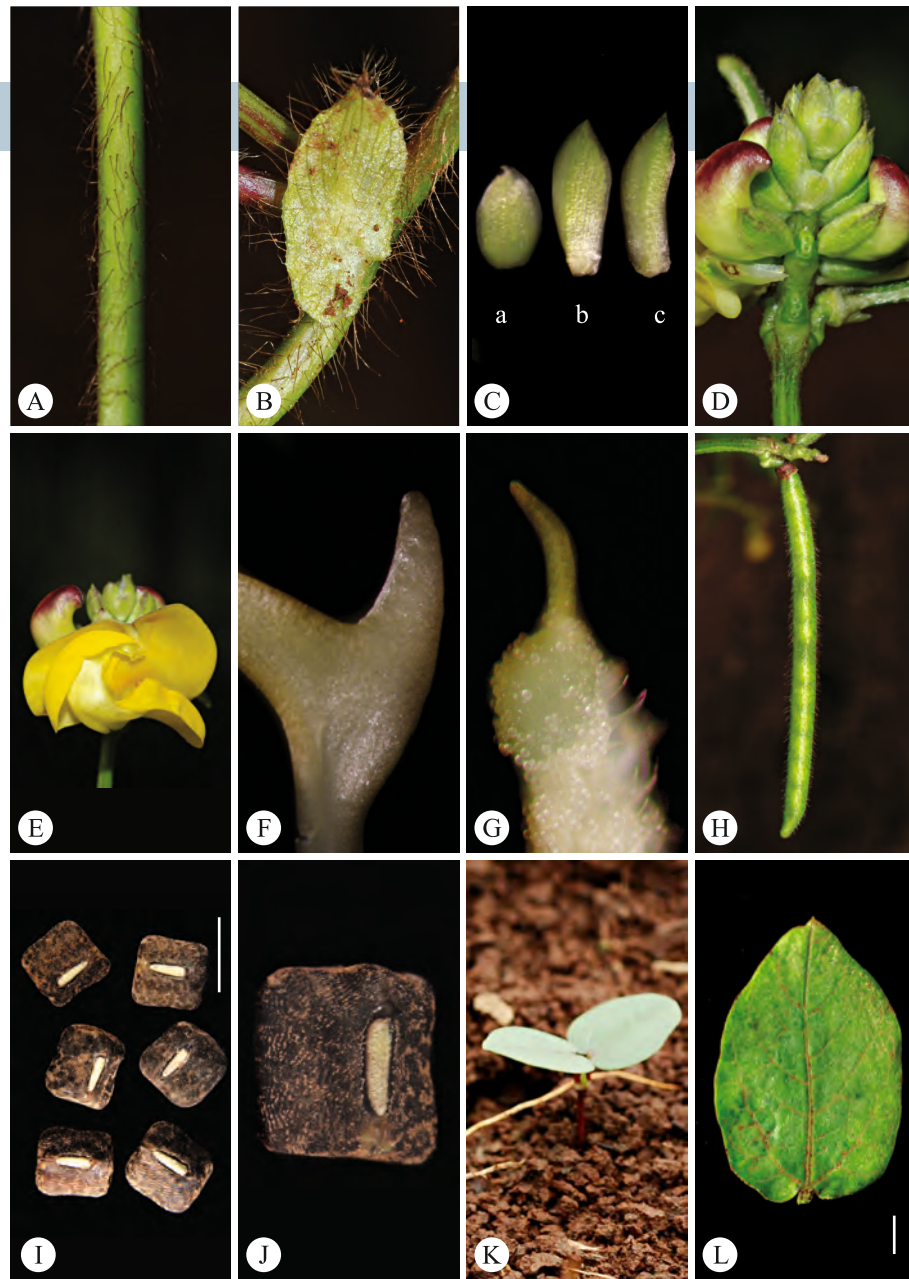
Distribution: India and Sri Lanka.

India: Andhra Pradesh, Karnataka, Kerala and Tamil Nadu.

Field notes: Grows in sandy soil and along costal line.

Chromosome number: 2n = 22.





Vigna trinervia var. *trinervia* (Heyne ex Wall.) Tateishi and Maxted A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

***V. trinervia* var. *trinervia* (Heyne ex Wall.) Tateishi & Maxted**

A twinning herb. Stem 120 - 150 cm long, densely covered with 1-2 mm long brown hairs. Leaves 3-foliolate, terminal leaflet narrowly ovate to rhomboidal, lateral leaflets obliquely ovate. Stipule long elliptic, medifixed, 1.3-1.4 x 0.5-0.6 mm. Inflorescence 4-14 flowered; flowers golden yellow, 17-17.5 mm in diam. Pods linear, cylindrical and densely hairy, 4.5-5 x 0.3-0.4 cm, dark brown to blackish when mature. Seeds rectangular, 10-14 per pod, rough, maroon to brown, 3 x 2.5 x 3 mm, aril not developed.

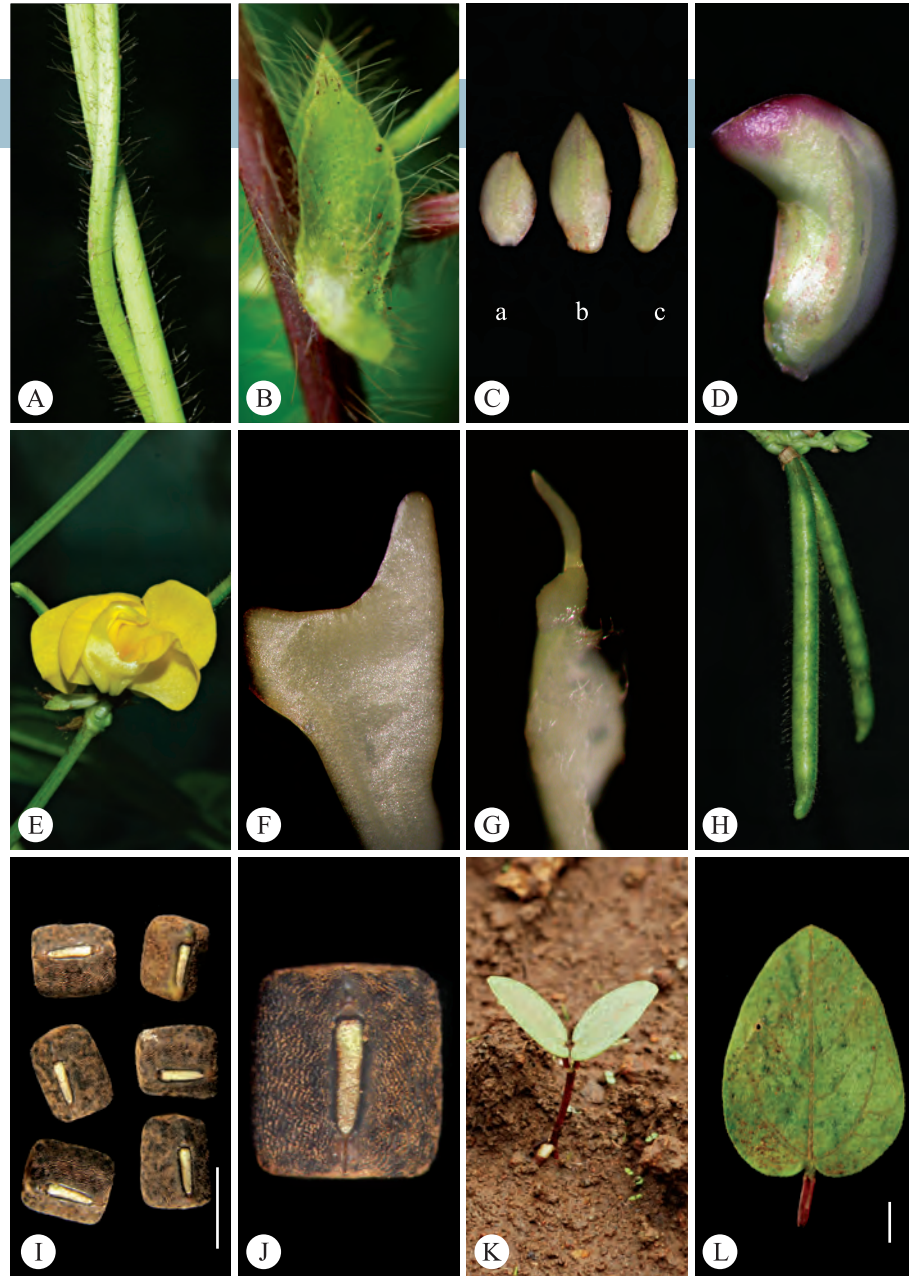
Flowering and fruiting: September to December

Distribution: India, Indonesia, Madagascar, Myanmar, Philippines, Sri Lanka, Tanzania, Thailand and The Comorous islands.

Field notes: Very robust species found in wet places among grasses and hedges. Leaflets sometimes marked with white blotch on upper surface.

Chromosome number: $2n = 22$.





Vigna trinervia var. *bourneae* (Gamble) Tateishi and Maxted A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

***V. trinervia* var. *bourneae* (Gamble) Tateishi & Maxted**

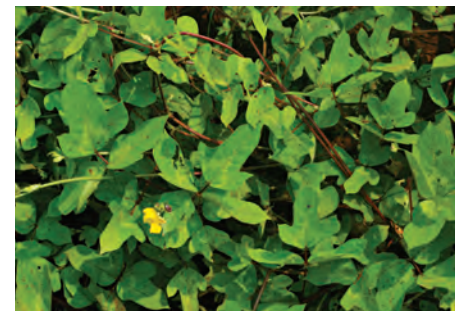
A twinning herb. Stem 120 - 150 cm long, densely covered with 2- 2.5 mm long yellowish brown hairs. Leaves 3-foliolate, with white blotch, terminal leaflet narrowly ovate to rhomboidal, lateral leaflets obliquely ovate. Stipule long elliptic, medifixed, 12-14 x 4-5 mm. Inflorescence 6-10 flowered, flowers golden yellow; 20-21 mm in diam. Pods linear, cylindrical and densely hairy, 3.5-4 x 0.3-0.4 cm, dark brown to blackish when mature. Seeds rectangular, 10-14 per pod with rough reticulate surface, maroon to brown, 3 x 3 x 2.5 mm, aril not developed.

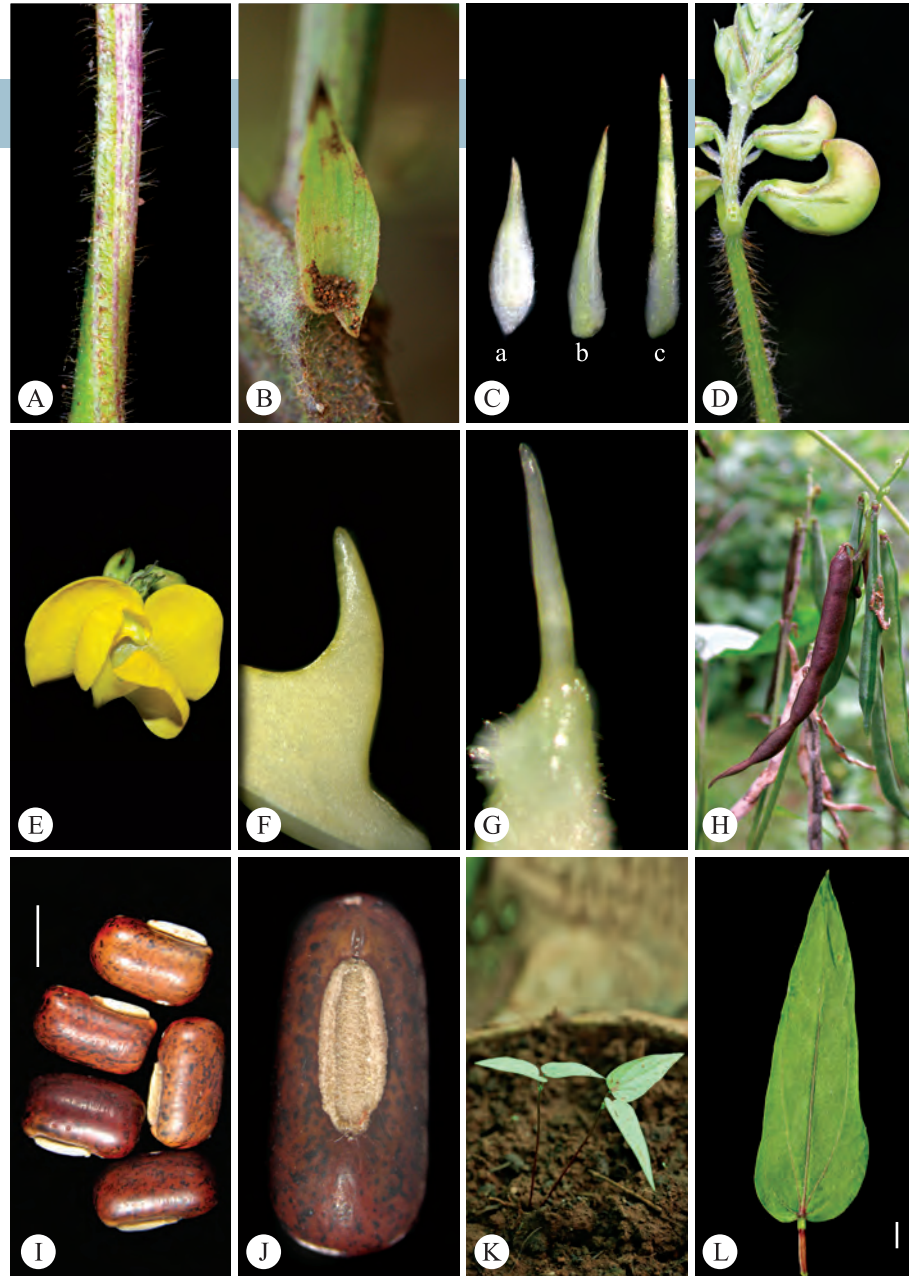
Flowering and fruiting: September to December

Distribution: India: Goa, Karnataka and Tamil Nadu.

Field notes: Very robust species found along roadside and in Ghats. Leaflets marked with white blotch on upper surface.

Chromosome number: 2n = 22.





Vigna umbellata (Thumb.) Ohwi & Ohashi (Cultivated) A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

V. umbellata (Thumb.) Ohwi & Ohashi (Cultivated)

Twinning or sub erect herb. Stem 120-150 cm long, densely covered with 1-1.2 mm long greyish white hairs. Leaves 3-foliolate, terminal leaflet narrowly ovate to rhomboidal, lateral leaflets obliquely ovate. Stipule narrowly elliptic to falcate, medifixed, 10-12 x 3-4 mm. Inflorescence 20-30 flowered; flowers large golden yellow, 22-25 mm in diam. Pods linear, pendulous, compressed and very sparsely covered with white hairs or glabrous, 11-12 x 0.4-0.45 cm, buff to brown colored when mature. Seeds elliptic, 10-12 per pod, smooth, shiny, pale yellow or pale brown, 7.5 x 4 x 2.5 mm, aril well developed.

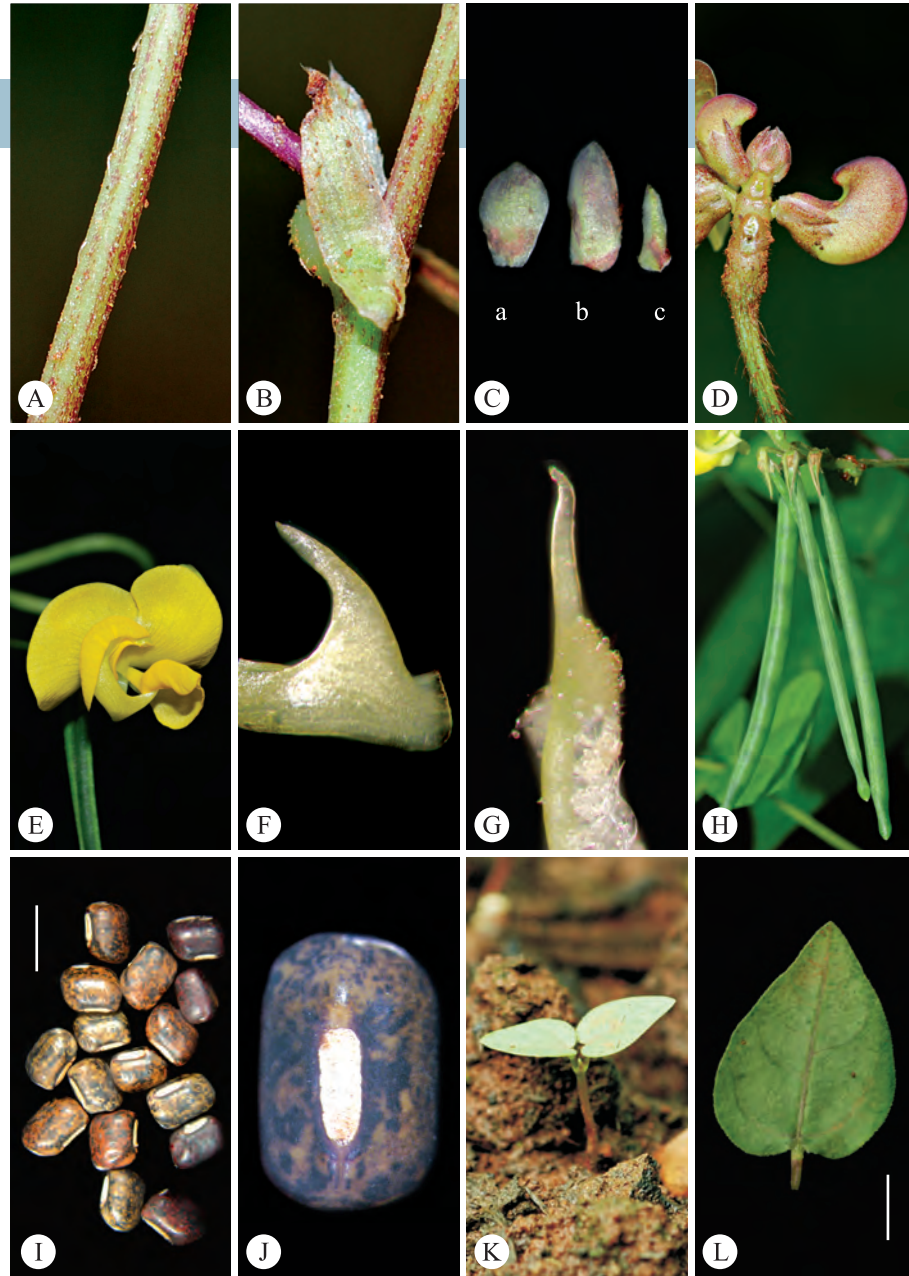
Flowering and fruiting: August to November

Distribution: India, also cultivated in Tropics.

Field notes: Cultivated form has many flowered inflorescence bearing golden yellow flowers.

Chromosome number: $2n = 22$.





Vigna umbellata (Thunb.) Ohwi & Ohashi (Wild) A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

V. umbellata (Thunb.) Ohwi & Ohashi (Wild)

A twining herb. Stem 120-150 cm long, sparsely to densely covered with 0.7 mm long white hairs. Leaves 3-foliolate, terminal leaflet narrowly ovate to rhomboidal, lateral leaflets obliquely ovate. Stipule narrowly elliptic to rather falcate, medifixed, 7.5-8 x 2.2-2.5 mm. Inflorescence 10-20 flowered; flowers golden or lemon yellow, 10.5-11 in diam. Pods linear, pendulous sparsely covered with minute hairs, 5-6 x 0.25-0.3 cm, grayish black when mature. Seeds elliptic, 10-14 seeds per pod, smooth, shiny, blackish brown, 3 x 2.5 x 2 mm, aril poorly developed.

Flowering and fruiting: September to November

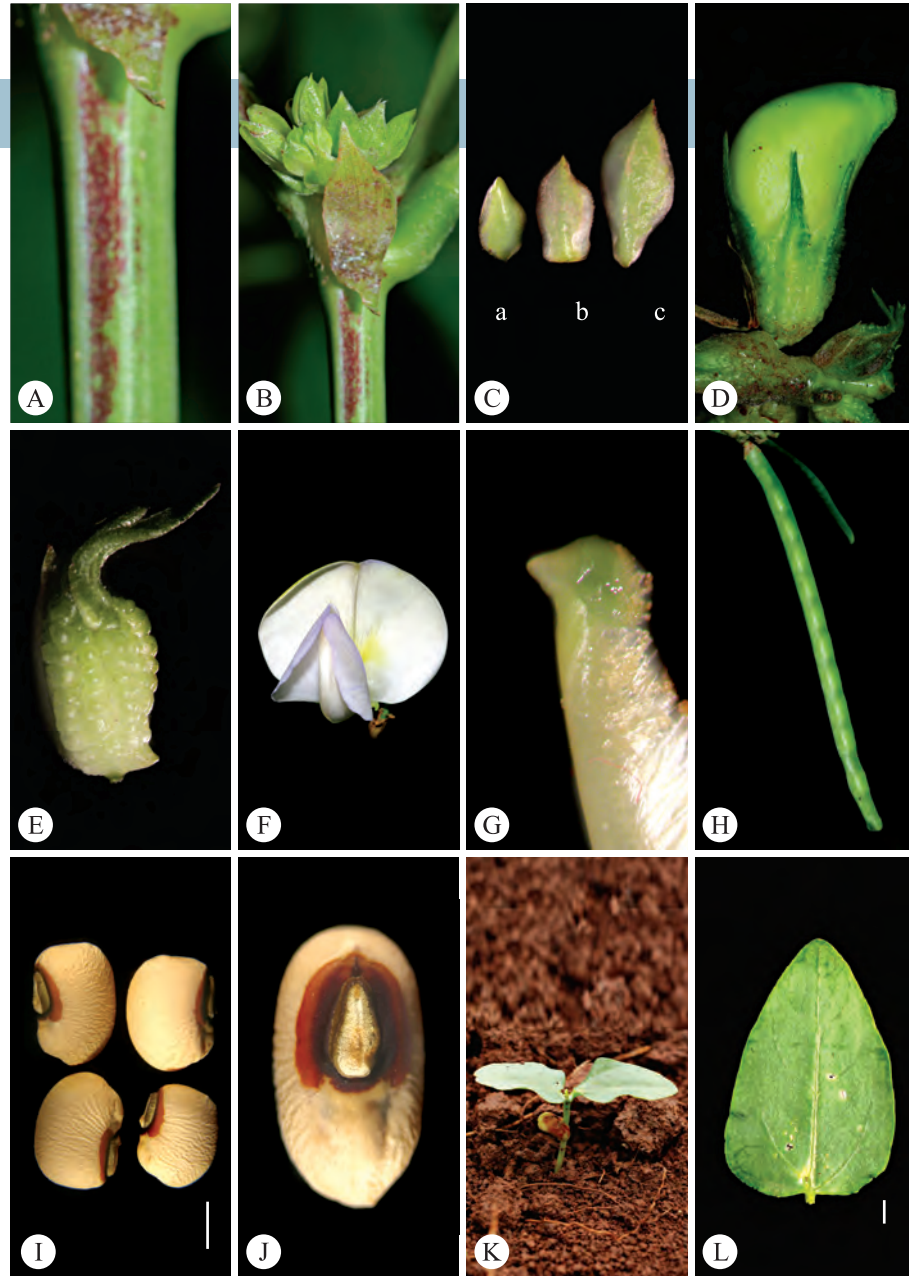
Distribution: India, Myanmar and Thailand.

India: Karnataka, Mizoram and Orissa.

Field notes: Grows in disturbed habitat such as road side, beside paddy field and near streams.

Chromosome number: $2n = 22$.





Vigna unguiculata (L.) Walp. A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Calyx, F. Flower, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

***V. unguiculata* (L.) Walp.**

Erect or scandent or straggling or trailing or twining herb. Stem 120-150 cm long glabrous or sometimes sparsely to densely covered with 0.8-1 mm long white hairs. Leaves 3-foliolate, terminal leaflet ovate, lateral leaflets obliquely ovate. Stipule ovate to lanceolate, medifixed, 15-18 x 4-5 mm. Inflorescence 8-10 flowered; flowers bluish white or pale white or pink, 2.5-2.7 mm in diam., calyx tuberculate. Pods subterete, subcompressed and glabrous or puberulent, 16-18 x 0.9-1 cm, pale yellow when mature. Seeds rounded, 10-16 per pod, smooth, pale yellow, 10 x 5 x 7 mm, aril slightly developed.

Flowering and fruiting: September to March.

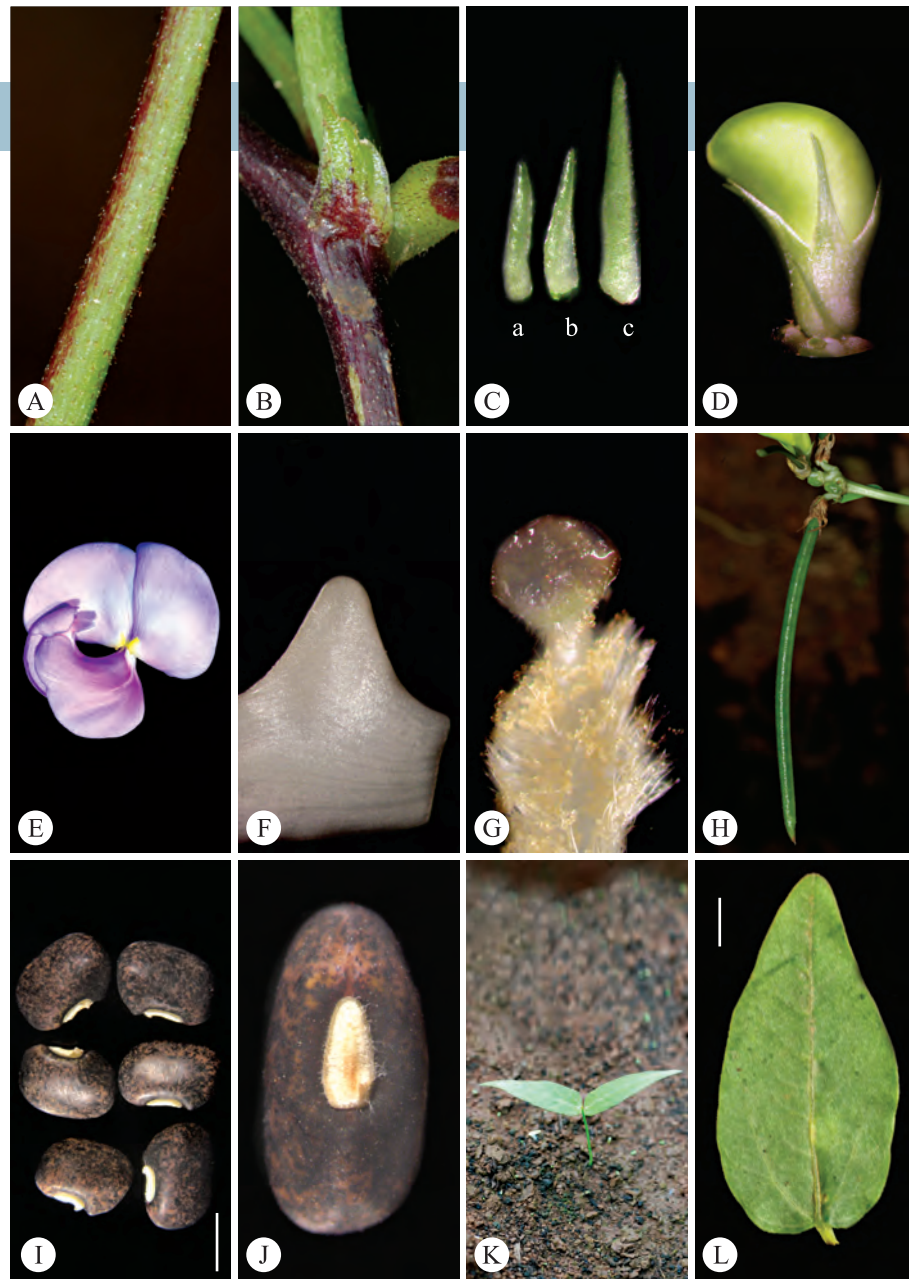
Distribution: India, widely grown in Tropics.

India: Kerala, Maharashtra, Orissa, Tripura, Uttaranchal and West Bengal.

Field notes: Cultivated species can be distinguished by its long pods and bluish white or pale white or pink flowers.

Chromosome number: $2n = 22$.





Vigna vexillata (L.) A. Rich. A. Stem, B. Stipule, C. Primary bract (a); Secondary bract (b); Bracteole (c), D. Bud, E. Flower, F. Keel pocket, G. Beak, H. Pod, I & J. Seed, K. Seedling and L. First leaf. Scale bar 3 mm

***V. vexillata* (L.) A. Rich.**

Twinning or straggling, perennial herb with tuberous root stalk. Stem 150-200 cm long, glabrescent or sparsely covered with 0.2-0.6 mm long yellowish brown hairs. Leaves 3-foliolate, terminal leaflet narrowly ovate to ovate, lateral leaflets obliquely ovate. Stipule ovate to triangular, basifixed, 7-8 x 2-2.2 mm. Inflorescence few flowered (2-4), flowers light purple, 3.5-3.7 cm in diam. Pods linear, cylindrical and glabrescent, 11-13 x 0.4-0.5 cm, grayish black when mature. Seeds rounded, 10-15 per pod, smooth, shiny, black, 4.5 x 3 x 3.2 mm, aril developed.

Flowering and fruiting: August to December

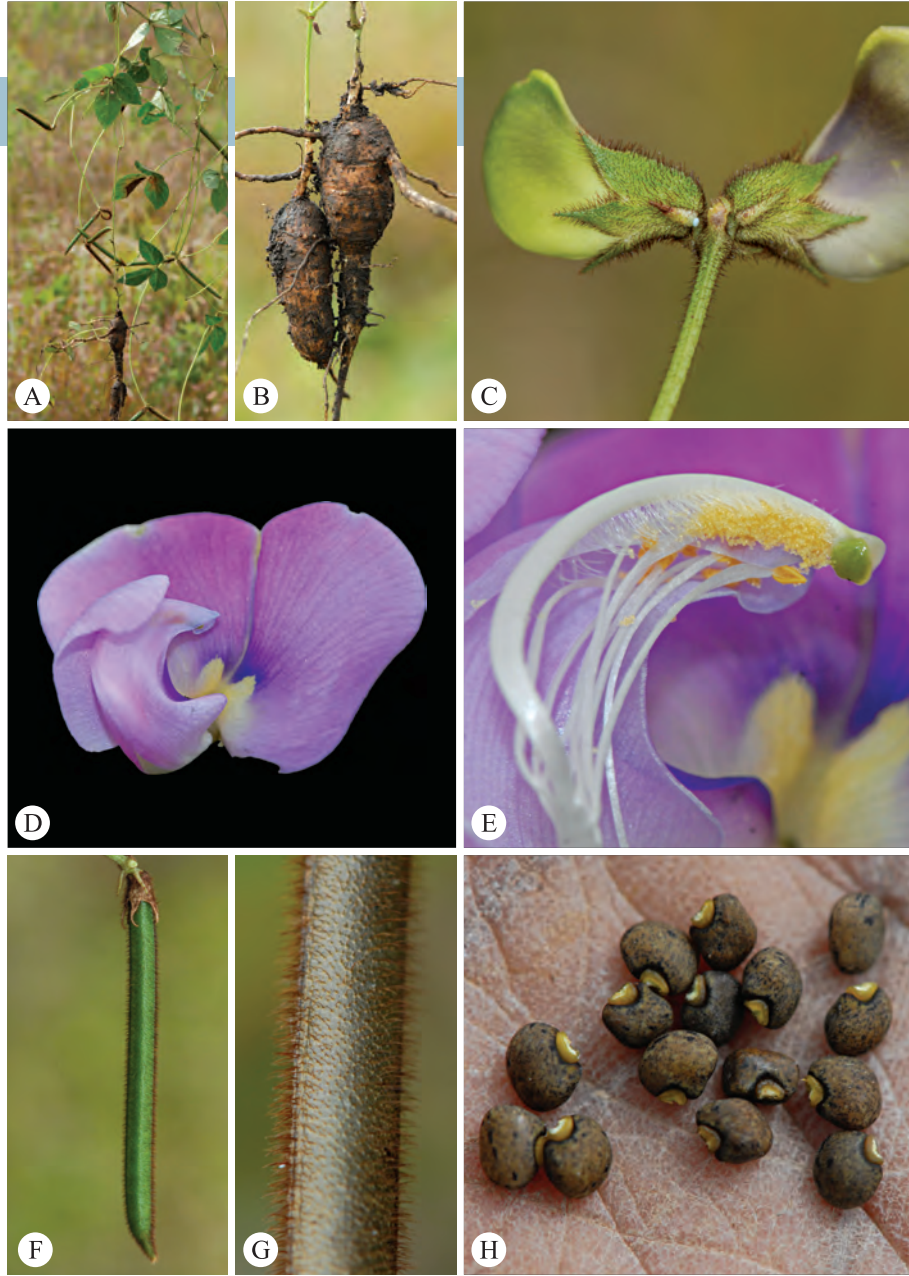
Distribution: India, Cosmopolitan in tropics, Australia.

India: Goa, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Punjab, Rajasthan, Shillong, Tamil Nadu and Uttaranchal.

Field notes: Highly variable with respect to hairiness, shape and size of leaflets.

Chromosome number: $2n = 22$.





V. vexillata var. *stocksii* Benth. ex Baker A. Habit, B. Root, C. Bud, D. Flower, E. Staminal tube, F & G. Pod and H. Seeds.

***V. vexillata* var. *stocksii* Benth. ex Baker**

Scandent or trailing herbs with tuberous root stalk. Stem 120-180 cm long, glabrescent or sparsely covered with 0.8-1 mm long ferrugineous hairs. Leaves 3-foliolate, terminal leaflet narrowly ovate to ovate, lateral leaflets obliquely ovate. Stipule ovate lanceolate, basifixed, 4-4.5 x 2-2.5 mm. Inflorescence few flowered (2-5), flowers light purple, 3.4-3.6 cm in diam. Pods linear, cylindrical and glabrescent, 6.5-7 x 0.3-0.4 cm, grayish black when mature. Seeds rounded 10-12 per pod, smooth, shiny, black, 4.2 x 2.8 x 3mm, aril developed.

Flowering and fruiting: August to December

Distribution: India. **India:** Hilly tracts of Peninsular and Eastern India, Karnataka, Kerala, Maharashtra, Tamil Nadu, Madhya Pradesh, Bihar and Orissa.

Field notes: This variety is densely covered with 1-2 mm long brown hairs.

Chromosome number: 2n = 22.

Key to the varieties of *Vigna vexillata*

- 1a. Leaf narrowly lanceolate, 2-2.5 cm broad.....var. *angustifolia*
- 1b. Leaflets ovate-deltoid, more than 3 cm broad..... 2
- 2a. Leaflets membranous, glabrescent. Stems, petioles and peduncles sparsely covered with short, brown hairs..... var. *sepiaria*
- 2b. Leaflets coriaceous, pubescent with rusty-brown hairs. Stems, petioles and peduncles densely covered with long, rusty brown hairs..... 3
- 3a. Calyx densely villous with short, rusty-brown hairs. Leaflets subobtusate, mucronate var. *wightii*
- 3b. Calyx hirsute with long, rusty-brown hairs. leaflets acuminate 4
- 4a. Leaflets 4-15 cm long. Flowers 2.5 cm long. Calyx lobes up to 2 cm long. var. *vexillata*
- 4b. Leaflets less than 6 cm long. Flowers 2 cm long. Calyx lobes up to 1 cm long. var. *stocksii*



Flowers of Indian *Vigna*



Seeds of Indian *Vigna*



Note :

