

A revision of *Mucuna* (*Leguminosae* – *Phaseoleae*) in the Indian subcontinent and Burma

C. M. WILMOT-DEAR

Summary. An account of the nine species of *Mucuna* Adans. found in the Indian subcontinent and Burma is offered, with keys and distribution maps. One species, *M. hirsuta* Wight & Arn., is reduced to a variety of *M. pruriens* (L.) DC. All specimens cited have been seen.

As an extension of a previous revision of *Mucuna* in China and Japan (Wilmot-Deare 1984), this account of the species from the Indian subcontinent and Burma is offered.

***Mucuna* Adans.**, Fam. Pl. 2: 325 (1763); Prain, Journ. As. Soc. Bengal 66: 404 (1897), nom. conserv.

For synonymy and generic description see Wilmot-Deare (1984: 23).

The nine species found in the Indian subcontinent and Burma are described below, one further species, *M. hirsuta* Wight & Arn., being reduced to a variety of *M. pruriens* (L.) DC. Of these, *M. imbricata*, *M. atropurpurea* and the above mentioned variety are endemic to the region, the latter two being restricted to Peninsular India; four of the remainder are restricted to the North and East of the region and occur also in China and/or Indochina and the Malay Islands while a further species occurs also in Peninsular India; only two, *M. pruriens* (excluding var. *hirsuta*) and *M. gigantea*, are more widely distributed.

KEYS TO SPECIES OF MUCUNA IN THE INDIAN SUBCONTINENT AND BURMA

A. Flowering material

1. Standard and wings with marginal pubescence in apical region up to $\frac{1}{4}$ – $\frac{1}{3}$ length; leaflets without persistent stipels **1. macrocarpa**
Standard and wings without pubescence or pubescent only in basal, claw, region; leaflets with or without persistent stipels 2
2. Flowers greenish or pinkish white, 3–4 cm long, crowded in distal $\frac{1}{4}$ of flowering axis or less, pedicels of very varying length, decreasing towards apex to give inflorescence a corymbose appearance. **7. gigantea**
Flowers purple or white, of various lengths, equally spaced or if only in distal $\frac{1}{2}$ of inflorescence then pedicels all of approximately equal length, inflorescence of racemose appearance 3
3. Keel (5–)5.5–6 cm long; leaflets with or without persistent stipels . . . 4
Keel up to 4(–4.5) cm long; leaflets with persistent stipels 6
4. Flowers (5.3–)6–7 cm long; leaflets without persistent stipels
. **2. sempervirens**
Flowers 5.5–6 cm long; leaflets with persistent stipels 5

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5. Leaflets drying rather light greenish-brown, usually at least twice as long as wide, narrowly elliptic, narrowing abruptly to a wide acumen terminating abruptly in a mucronate tip; lateral veins 3-5 making an acute angle with midrib, basal pair usually extending into upper $\frac{1}{2}$, second pair often almost to tip; calyx-lobes usually all of similar length and rather broad throughout length. (Peninsular India; Sri Lanka)
- **6. atropurpurea**
- Leaflets usually drying rather blackish green, usually less than twice as long as wide, elliptic to ovate, narrowing abruptly or gradually into a gradually-tapering acumen; lateral veins (4-)5-7, making a \pm obtuse angle with midrib, even second pair usually extending little into upper half; calyx lobes usually triangular, lowest markedly longest (Himalayas to Burma; East Central India; Sri Lanka) **4. nigricans**
6. Stem, petioles, inflorescence axis and peduncles with sparse or dense long crisped orange hairs (often also with shorter \pm adpressed hairs); leaflets usually rather thick, underside densely silky-pubescent especially on veins; calyx with both dense fine hairs and abundant coarse red-brown deciduous very irritant bristles. **9b. pruriens var. hirsuta**
- Stem, petioles, inflorescence axis and peduncle with sparse or abundant short pale \pm adpressed hairs; leaflets various but indumentum rarely silky, not denser on veins; calyx various but bristles usually finer and less deciduous 7
7. Basal part of inflorescence without flowers but with many bract-scars, some bracts usually also present; leaflets usually rather thickly chartaceous or coriaceous, markedly paler (greenish grey when dry) beneath with midrib and lateral veins rather stout, dark, prominent and much less pubescent than surface; terminal leaflet rhombic-ovate **8. bracteata**
- Basal part of inflorescence with or without flowers, no bract-scars below flowering part, bracts early deciduous; leaflets thinner, chartaceous or membranous, not markedly discolorous, venation not stout nor conspicuously dark and less pubescent than surface; leaflet shape various 8
8. Flowering axis very short, up to 6 cm, often branched near base, each branch with up to 4 flower-bearing side-branches; calyx lobes small, laterals minute up to 2 mm long usually up to $\frac{1}{2}$ length of lowest lobe and $\frac{1}{4}$ length of tube. **3. monosperma**
- Flowering axis various but usually at least 12 cm long, usually unbranched and with more than 7 flower-bearing side-branches; calyx-lobes longer, laterals at least 4 mm long, often $\frac{1}{2}$ length tube or more 9
9. Leaflets usually membranous, veins thin but prominent beneath, lateral leaflets very assymetrical, base of abaxial half much expanded, \pm truncate, keel 3-4.2(4.5) cm long; calyx surface often invisible beneath densely silky hair-covering **9. pruriens (excl. var. b. hirsuta)**
- Leaflets usually somewhat thicker, thinly chartaceous, veins therefore less prominent beneath, lateral leaflets with abaxial half less expanded, broadly rounded at base; keel at least 4 cm long; calyx surface usually partly-visible beneath more sparse covering of shorter brownish hairs **5. imbricata**

B. *Fruiting material*

1. Pod large, usually at least 30 cm long when mature, woody, linear, often

- torulose, without marginal wings or raised lamellae on surface; leaflets without persistent stipels. 2
- Pod smaller, up to 15 cm, coriaceous or fleshy, shape and surface various; leaflets with persistent stipels 3
2. Mature pod surface with firm rounded raised margin along sutures, rather conspicuous (but not very prominent) reticulate patterning and sparse fine short hairs; leaflets with fine but prominent reticulate venation, coarser reticulation not distinguishable from fine, indumentum never dense **2. sempervirens**
- Mature pod surface without firm rounded margin along sutures, wrinkled or prominently coarsely rugose-reticulate-patterned, often glabrous; leaflets with fine reticulate venation only partly visible, distinct from coarse reticulation, indumentum sometimes dense beneath **1. macrocarpa**
3. Pod with 5–20 conspicuous oblique lamellae arising from surface and a pair of distinct marginal wings along each suture 4
- Pod without lamellae, with or without marginal wings. 7
4. Each lamella on pod surface bifurcating to give 'T' shape in cross-section with a pair of raised or revolute margins; lamellae crowded, almost touching, running from one or other margin obliquely, all parallel, to $\frac{1}{2}$ width of pod and terminating along mid-line in rounded apices; pod 2-seeded 5
- Each lamella a simple raised flap, all less crowded with surface \pm visible between; some lamellae often running obliquely whole width of pod, parallel or not; pod 1-several-seeded 6
5. Seed very large, 2.5–3.5 cm in longest dimension, pinkish or reddish brown with black mottling; pod with marginal wing 1–1.5 cm wide, crenate, not inrolled, with prominent reticulate patterning; lamellae at least 0.7 cm wide, fairly thin, margins not revolute (East Himalayas; Sri Lanka) **5. imbricata**
- Seed up to 2 cm long, black; pod with marginal wing up to 0.5 cm wide, somewhat inrolled; lamellae up to 0.5 cm wide, rather more robust, with flat or tightly revolute margins (Peninsular India; Sri Lanka) **6. atropurpurea**
6. Pod with 2–4 black seeds and linear-oblong in shape, usually at least 3 times as long as wide, lamellae 18–24, parallel, some interrupted near middle giving indistinct mid-line to pod; calyx-lobes large, 0.6 cm long or more **4. nigricans**
- Pod with single red-brown seed and broadly oblong, less than twice as long as wide, often wider than long, often with very convex margin and lamellae converging towards centre of pod; lamellae 5–6; calyx-lobes smaller, laterals 0.2 cm long or less **3. monosperma**
7. Mature pod coriaceous with marginal wings at least 0.5 cm wide; oblong, 7–15 cm long, 4–5 cm wide; surface with reticulate pattern of raised lines so fine as to give pitted appearance. **7. gigantea**
- Mature pod fleshy without marginal wing, linear, often torulose and curved, 3–9 cm long up to 2 cm wide; surface usually invisible beneath dense covering of silky hairs or irritant bristles. 8
8. Pod with dense pale adpressed silky hairs, not rigid or irritant. **9c. pruriens** var. **utilis**

- Pod with dense orange or brown \pm erect rigid irritant deciduous bristles 9
9. Stems, petioles, inflorescence axis and pedicels with sparse or dense long crisped orange hairs (often also shorter adpressed hairs); leaflets often rather thick, underside densely silky-hairy especially along veins; pod \pm straight **9b. pruriens** var. **hirsuta**
 Stems, petioles, inflorescence axis and pedicels glabrous or with sparse or abundant short pale \pm adpressed hairs; leaflets various, rarely silky-hairy, indumentum not noticeably denser on veins; pod markedly curved, often 's'-shaped. 10
10. Leaflets quite thick, chartaceous or coriaceous, markedly paler (greenish grey when dry) beneath with midrib and lateral veins rather stout, dark, prominent and less pubescent than surface; terminal leaflet rhombic-ovate, lowest part of infructescence without fruit but with many bract-scars, bracts often still present **8. bracteata**
 Leaflets thinner, membranous or thinly chartaceous, not markedly discoloured, venation not stout nor conspicuously dark and less pubescent; leaflet shape various; no bract-scars below fruiting part of infructescence, bracts early deciduous **9a. pruriens** var. **pruriens**

A. Subgenus MUCUNA

Woody; seeds discoid, large and flat, with hilum extending around $\frac{3}{4}$ of the circumference.

1. *Mucuna macrocarpa* Wall., [Num. list 5618 &] Pl. As. Rar. 1: 41 t. 47 (1830); Bak. in Hook. f., Fl. Brit. Ind. 2: 187 (1876); Kanjilal & Das, Fl. Assam 2: 67 (1938); Ohashi in Hara, Fl. E. Himalayas 2: 67 (1971); Thothathri in Mat. for Fl. Bhutan in Rec. Bot. Surv. Ind. 20(2): 79 (1973); Balakrishnan, Fl. Jowai: 150 (1981); Wilmot-Dear in Kew Bull. 39: 36 (1984) which see for further refs. and complete syns. Type: Nepal, *Wallich* 5618 (holotype K!; isotype BM).

M. collettii Lace in Kew Bull.: 398 (1915). Types: Burma: *Collett* 458 (syntype K!), *Lace* 5866 (syntype K!; isosyntype E!), *Hauxwell* s.n., *Rogers* 19 (syntypes E!); Yunnan, *Henry* 11702 (syntype K!; isosyntype A!).

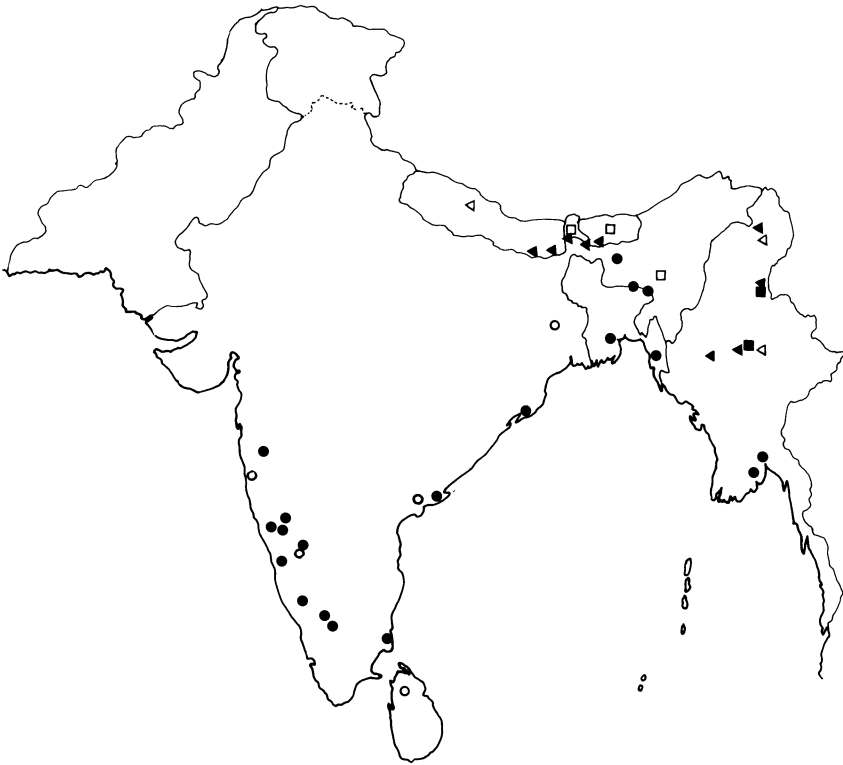
For description see Wilmot-Dear (1984: 36–38). (Map 1).

NEPAL. Toka, April 1821, *Wallich* 5618 (holotype K; isotype BM); W of Meklajam, 24 May 1969, *Williams* 166 (BM). E: Dharam, 11 March 1967, *Stainton* 5693 (BM).

SIKKIM. Himalayas, *Gammil* s.n. (CAL); 1–4000': Tung-y-rip & Pankabari, *Hooker* s.n.; Gangtok, 7 April 1966, *Stainton* 5304 (see note below) (BM).

BHUTAN. Sarbhang Dist., 17 March 1982, *Grierson & Long* 3803 (E); Chaisilakha, 21 Dec. 1963, *Subba Rao* 287 (CAL).

BURMA. N: Kachin State, Sumprabaung, *Keenan et al.* 3849 (E). N.E.: Hills around Hlawgair, Oct. 1924, *Forrest* 26012 (E). Shan States: Shan Hills, March 1888, *Collett* 458 (syntype *M. collettii*, K). Mandalay Dist., Maymyo, 30 April 1915, *Gilbert Rogers* 971 (E) & 3600', Feb. 1914 & 3500 ft. (no date), *Hauxwell* s.n. (syntypes *M. collettii*, E) & 3 Aug. 1912, *Lace* 5866 (isosyntype *M. collettii* E; syntype K). S Chin Hills, Minlat, 6 March 1856, *Kingdon Ward* 21744 (BM).



MAP 1. Distribution of *Mucuna macrocarpa* ▲; *M. sempervirens* ■; *M. monosperma* ● in the Indian subcontinent & Burma. (◁ □ ○ indicate exact locality uncertain.)

INDIA. W Bengal, Darjeeling: Dulka Jhar, March 1875 & Feb. 1876 & 4 April 1876, *Gamble* 465 (DD, K) & 465A (K) & 465C (BM); 2 Aug. 1876 & 13 April 1876 & May 1879, *Gamble* 886 & 27496A & 6695 (K). Meghalaya: Jaintea, Shampoong, *Clarke* 18292 (K); Khasia & Jaintea, *Deha* 18882 (AS-SAM).

One collection, *Stainton* 5304, is stated to have "pale yellow" flowers; this is possibly a colour variant lacking the purple wings.

EXTERNAL DISTRIBUTION. China (extreme S & W); Hainan; Taiwan; Ryukyu Is.; Thailand; Vietnam.

HABITAT. Montane forest to open thickets; 1000–2700 m.

2. *Mucuna sempervirens* Hemsl. in Forbes & Hemsl. in *J. Linn. Soc. Bot.* 23: 190 (1887) & in Curtis's *Bot. Mag.* t. 7978 (1904); Wilmot-Dear in *Kew Bull.* 39: 39 (1984) which see for further syns. Type: China: Hubei, Ichang, *Henry* 1065 (holotype K!; isotype P!).

For description see Wilmot-Dear (1984: 39–40). (Map 1).

SIKKIM. 25 April 1876, *Clarke* 27608 (K); 1–4000', *Hooker* s.n. (K).

BHUTAN. Chukka Distr., 25 Feb. 1982, *Grierson & Long* 3264 (E). Mirichana Tuipu, 21 Nov. 1914, *Cooper* 3667 (E).

BURMA. NE, Maikha-Salwin divide, May 1919, *Forrest* 17877 (E). Mandalay Distr., Maymyo, 2 June 1912 & 12 March 1913, *Lace* 5811 & 6118 (E, K).

INDIA. W. Bengal: Darjeeling: June 1876, *Gamble* 834 (DD) & 834A (K) & Birch Hill Peak, 20 April 1895, *Talbot* 3325 (BSI) & 13 April 1876, *Clarke* 27496 (BM) & Batassi, 2 May 1960, *Kanai et al.* 1986 (BM). Manipur: 'E. Himalaya', 7 April 1842, *Griffith* 1/199 (K).

Two specimens (Burma, Bhamo, *Lace* 5857 (K) & Darjeeling, 1874, *Treutler* 76 (K)), are stated to have greenish-white flowers; this is possibly merely a colour variant since in all other respects they match this species.

EXTERNAL DISTRIBUTION. China.

HABITAT. Subtropical forests and river valleys; 1500–3500 m.

3. *Mucuna monosperma* DC. ex Wight in Hook., Bot. Misc. 2: 346 (1831); Wight & Arn., Prod. 1(2): 256 (1834); Bak. in Hook., Fl. Brit. Ind. 2: 185 (1876); Trimen, Handb. Fl. Ceylon 2, 61 (1894); Prain, Bengal Fl. 1: 399 (1903); Cooke, Fl. Bombay Pres. 1: 364 (1903); Kanjilal & Das, Fl. Assam 2: 67 (1938); Matthew, Fl. Tamil Nadu Carnatic: 194 (1981). Type: Eastern India, Kungence Hill, March 1810, *Roxburgh* 276 (lectotype BM! selected here; ? isolectotype K!).

Carpopogon monospermum Roxb., [Hort. Beng.: 54 (1814) &] Fl. Ind. 3: 283 (1832). Type as for *Mucuna monosperma* (lectotype BM! selected here).

Mucuna anguina Wall., Pl. As. Rar. 3: 19 & t. 236 (1832). Type: India [Bangladesh]: Chittagong, Hort. Calc. 1811, *Roxburgh* s.n. (holotype? CAL, not found).

Stizolobium monospermum (DC. ex Wight) O. Kuntze, Rev. Gen. Pl. 1: 208 (1891).

Mucuna cristata Buch.-Ham. ex Wall. Num. List 5623 B; nom. nud.

Climber; often large and woody; bark with prominent small dark lenticles; stem and petioles with fairly abundant to very dense fine reddish adpressed hairs and sparse coarser hairs. *Stipules* soon deciduous, linear-lanceolate, hairy as stem. *Leaves* up to 28 cm long, terminal leaflet 7–13(–15.5) × (3–)5–7.5(–9) cm, broadly (rarely narrowly) elliptic or ovate (rarely obovate), narrowing abruptly at apex to short wide acumen up to 3 mm long with mucronate tip, cuneate or ± truncate at base; lateral leaflets of similar length, fairly asymmetrical, abaxial $\frac{1}{2}$ usually $1\frac{1}{2}$ –2 × as wide as adaxial, expanded lower part truncate to rounded or broadly cordate; lateral veins (4–)5–6 arising at obtuse angle from midrib, curving gradually and becoming indistinct near margin with basal pair extending little into upper $\frac{1}{2}$ of leaflet, thinly prominent, secondary veins and reticulation often hardly visible; membranous to thinly chartaceous, drying blackish, with sparse to dense red hairs as on the stem (but finer and shorter) on both sides, sometimes glabrescent above; stipels filiform or more robust, 0.5–3 mm long, hairy as stem. *Inflorescences* very short, 3–6 cm long, often branched near base or several arising from same axil, sidebranches 2–4, secondary branches completely reduced or up to 4 mm, individual pedicels 6–10 mm; axis and pedicels with golden or reddish ± adpressed hairs as on the stem and irritant reddish bristles more abundant on pedicels; bracts not seen, bracteoles early deciduous, linear-lanceolate, 1.5–3 mm long, acute, ± amplexicaul at base. *Calyx* pubescent as the axis but red bristles more abundant; tube a narrow or medium cup, c. 7 × 10 mm; all teeth rather short,



FIG. 1. *Mucuna monosperma*. **A** inflorescence; **B** leaf; **C** bud with bracteoles; **D** flower; **E** calyx opened out; **F** standard; **G** wing; **H** keel; **J** pistil; **K** fruit; **L** seed. **A** from *Law* s.n.; **B**-**J** from *Saldanha et al.* 1133; **K**, **L** from *HRH Prince of Wales* s.n. (1876). **A**, **B**, **K**, **L** $\times \frac{2}{3}$, **C** $\times 2$, **D**-**J** $\times 1$. Drawn by Eleanor Catherine.

lowest 4.5 × 1.5–4 mm sometimes acuminate, 2 laterals very short, c. 2 mm long and wide, upper lip rather indistinct, equalling laterals and with apex acute to rounded. *Corolla* dark purple (or ? rarely yellow), standard 2.5 cm long, slightly over $\frac{1}{2}$ keel length, basal auricles 2–3 mm long; wings 4–4.4 × 0.6 cm, apex narrowly rounded, basal claw 7 mm and auricles 3 mm long; keel ± equalling wing, basal claw 7 mm and auricles 3 mm long. *Fruit* leathery, 1–(very rarely 2–)seeded, asymmetrically oblong to elliptic, often broader than long, with convex margins, upper usually more so, 4.5–7.5 × 3.5–5 cm (excluding marginal wings), laterally flattened but swollen around the large seed, up to 2 cm in thickness, with sparse short fine red hairs and abundant red-brown deciduous irritant bristles; lamellae 5–6, running obliquely from margin, tending to converge towards centre of pod face, not very robust, partly raised from pod surface and of irregular breadth up to 4(–5) mm with many completely interrupted at middle of pod, surface of pod usually partly visible between lamellae; each margin of pod with wide somewhat crenate wing ± 5 mm wide. *Seeds* red-brown, very large, ± 2.8 × 2.4 × 0.8–1.2 cm, kidney-shaped or oblong, flattened, hilum black, encompassing just over $\frac{1}{2}$ circumference, ± 2 mm wide. (Fig. 1, Map 1).

BANGLADESH. *Clarke* 16917 (K) & 8311 (BM); Chittagong: *King* 355 (CAL) & 642 (BM), *Parkinson* 4352 (DD), 1848, *Hooker* s.n. (K) & *Kaji Ve Nath*, July 1851, *Hooker & Thompson* s.n. (K); Sylhet, *Wallich* 5616E [mixed with leaf of *M. pruriens*] (K).

BURMA. Toungoo, *Gilbert Rogers* 233 (FHO); Insein, *Khaut* 56 (DD); Rangoon, *Parkinson* 14403 (K); Pegu, *Kurz* 2558 (K).

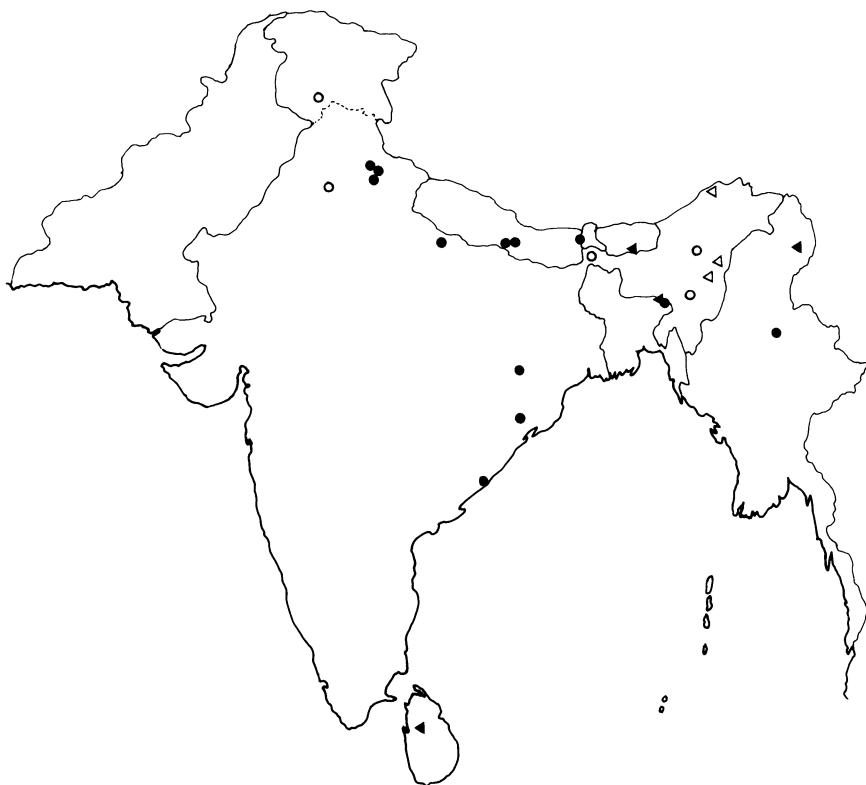
INDIA. W. Bengal/Bihar: *Roxburgh* 276 (lectotype BM; ? isolectotype (no data) K). Assam: (sens. lat) *Masters* s.n. (K); Goyalparo [Goalpara], *Wallich* 5623B (K). Meghalaya: Jaintea, *Clarke* 18292 (K); Khasia: *Hooker & Thompson* s.n. (K) & 17 Jan. 1879, *Jenkins* s.n. (CAL). Orissa: *Haines* 3889 & 4632 (K). Maharashtra: *Braganza* 527 (DD); *Bvenkara Reddi* 95860 (BSI); Concan: *Law & Stocks* s.n. (K) & *Kameswara Rao* 65 (K). Karnataka: Babuboodan Hills, *Law* s.n. (K); *Lowrie* 31 (DD); *Raghavan* 96977 (BSI); *Ritchie* 1714 (E, K); *Saldhana & Ramamorthi* H.F.P. 1133 (K); *Ramamorthi & Ghandi* H.F.P. 2773 (K) & *Saldhana* 13341 (E); *Sedgewick & Bell* 5710 & 4866 (K); *Talbot* 2124 (K). Andhra Pradesh: *Barber* 11692 (MH); *Subba Rao* 27241 (MH). Kerala: Nilgiri Hills: SE Wynaad: 1885, *Lawson* s.n. (K); [? same locality], 1831, *Graham* s.n. (E) & *Wight* s.n. (K). Tamil Nadu: *Wight* 752 (*Graham* 4) (BM, CGE, E); Nilgiri Hills, *Hooker & Thompson* s.n. (K); *Joseph* 13579 (MH); *Sebastine* 15684 (MH). S Andaman Is.: *Kramer, Nair et al.* BSI 6497 (K) & *Chauldari*, 27 Feb. 1892, *King* s.n. (CAL); Port Monat, 18 March 1893, *King* s.n. (CAL).

SRI LANKA. *Thwaites* C.P. 2662 (BM, PDA); 1839, *MacKenzie* s.n. (K); *Thwaites* C.P. 2662 (PDA); without collector, Lunugala, Uva, (PDA).

EXTERNAL DISTRIBUTION. Thailand, Malay Is.

HABITAT. Forests, clearings, thickets; 30–1500 m.

4. *Mucuna nigricans* (*Lour.*) *Steud.*, *Nom. Bot.* ed. 2, 2: 163 (1841); Ohashi in *Hara, Fl. E. Himal.* 1: 160 (1966); *Thothathri* in *Rec. Bot. Surv. India* 20: 79 (1973); *Ali* in *Nasir & Ali, Fl. W. Pakistan* 100: 238 (1977); *Babu, Herb. Fl. Dehra Dun*: 154 (1977); Ohashi in *Enum. Fl. Pl. Nepal* 2: 126 (1979); *Tateishi & Ohashi* in *Bot. Mag. Tokyo* 94: 100 (1981) which see for further refs. and syns.; *Deb, Fl. Tripura State* 1: 178 (1981); *Wilmot-Dear* in *Kew Bull.*



MAP 2. Distribution of *Mucuna nigricans* ● & *M. imbricata* ◄ in the Indian subcontinent & Burma. (○ ◄ indicate exact locality uncertain.)

39: 43 & 45 & fig. (1984). Type: [Vietnam] Cochinchina, *Loureiro* s.n. (holotype BM!)

Citta nigricans Lour., Fl. Cochinch.: 456 (1770) excl. references to Rumphius and Clusius.

var. **nigricans**; Tateishi & Ohashi loc. cit. (1981).

Mucuna gigantea DC. var. *nigricans* (Lour.) DC., Prod. 2: 405 (1825).

M. imbricata DC. ex Bak. in Hook.f., Fl. Brit. Ind. 2: 185 (1876) *pro parte* (specimens collected by Griffith and Hooker; see note on p. 33); *sensu* the following: Duthie, Fl. Upper Gang. Plain 1: 236 (1905); Haines, Forest Fl. Chota Nagpur: 324 (1910); Parker, Forest Fl. Punjab: 188 (1918); Osmaston, Forest Fl. Kumaon: 171 (1927); Gupta, For. Fl. Chakrata, Dehra Dun, Saharanpur, U.P. (revised ed. of Kanjilal, For. Fl. Siwalik etc): 176 (1928); Kanjilal & Das, Fl. Assam. 2: 66 (1938); Haines, Bot. Bihar Orissa 2: 296 (repr. ed. 1961); non Baker *sensu stricto*.

M. atropurpurea sensu Kanjilal, For. Fl. Siwalik & Jaunsar, U.P.: 152 (1911), non (Roxb.) DC.

Climber; stems and petioles glabrous or with sparse adpressed pale hairs. Stipules very early deciduous, not seen. *Leaves* up to 32 cm long; terminal leaflet

10–14(–17) × 5–9(–10.5) cm, elliptic or ovate, narrowing gradually or abruptly into often quite long (to 1 cm) acumen, extreme tip ± mucronate, base rounded or slightly cuneate; lateral leaflets of similar length, fairly asymmetrical, abaxial half rarely up to twice as wide as adaxial with expanded basal part truncate or slightly cordate; lateral veins (4–)5–7, arising at an obtuse angle from midrib, curving slightly but more sharply near margin and becoming indistinct, thinly prominent either side, secondary venation and reticulation visible or thinly prominent; membranous or thinly chartaceous, drying blackish, glabrescent or more usually with sparse to abundant hairs as on stem especially beneath, stipels terete, fairly robust, 4–5 mm long. *Inflorescences* arising from leaf-axils, 12–40 cm long with up to 8 side-branches arising usually in upper $\frac{2}{3}$ of axis, secondary branches completely reduced to small nodes, individual pedicels 1–1.3 cm long and often fairly robust up to 2 mm thick; axis and pedicels with short dense adpressed pale hairs often persistent in fruiting stage and scattered red-brown fine bristles; bracts and bracteoles not very early deciduous, a few often still attached to mature inflorescences, bracts broadly ovate, acute to acuminate, amplexicaul at base, 25–35 × 10–30 mm, bracteoles smaller, slightly exceeding calyx, oblanceolate or obovate and hooded, acute, 8–13 × 2.5–7 mm, both pubescent like the axis especially outside. *Calyx* with hairs as on axis but denser and longer, tube fairly narrowly cup-shaped, 1 × 1–1.6 cm, teeth long, lowest 1–1.4 cm, two laterals 0.6–1 cm long, all 0.3–0.6 cm wide, triangular, often very broad, acute or acuminate, upper lip often exceeding lateral teeth with rounded or mucronate apex. *Corolla* dark purple but see note below; standard 3–3.6 cm long, just over $\frac{1}{2}$ keel length, basal auricles up to 2 mm long; wings relatively wide, (5–)5.5–6 × 1–1.5 cm, apex slightly upcurved, rounded or almost acute, basal claw ± 10 mm and auricle 3–4 mm; keel equalling or slightly exceeding wing, basal claw 6–7 mm and auricle 1.5 mm. *Fruit* leathery, oblong and slightly downcurved at apex, (2–)3–4-seeded with upper margin slightly convex and sometimes swollen around seeds, 3–5 × as long as broad, 13–14 × 3.5–5.5 cm, much flattened laterally ± 1.5 cm thick, with abundant short fine red-gold hairs and dense red deciduous irritant bristles, also 18–24 raised lamellae running from margins across faces obliquely and ± parallel, these up to 0.5 cm wide, some narrowing or completely interrupted near mid-line of pod, surface of pod partly visible between ± erect lamellae (in young pod lamellae not discernible beneath dense bristle-covering); internal septa between seeds thin but rigid, often visible externally as slight indentations; each margin of pod with a pair of fairly flat wings 0.7–1 cm wide, wings and lamellae patterned with raised transverse parallel lines. *Seeds* black, oblong, flattened, 1.7–2(–2.5) × 1.5–2 cm, × 5–7(–10) mm thick; hilum black, encompassing between $\frac{1}{2}$ and $\frac{3}{4}$ circumference. (Map 2).

NEPAL. E, Arun Valley, 1956, *Stainton* 1577 (BM); C, Lothar, 1967, *Williams* & *Stainton* 8309 (BM); Iuranti Ithola, 1954, *Stainton et al.* 6858 (BM); Royal Chatwan Nat. Park., 1976, *Troth* 770 (BM).

?SIKKIM. "E. Himalayas", *Ribu* & *Romoo* s.n. (E).

BANGLADESH. Sylhet: *Hooker* s.n. (K) & *Hooker* & *Thompson* s.n. (PDA) & Chuna, 28 Aug. 1850, *Hooker* & *Thompson* s.n. (K).

BURMA. Shan States: Nov. 1890, *Hut* s.n. (CAL) & Gokteik Gorge, Nov. 1908, *Lace* 4155 (DD).

INDIA. W Bengal: Darjeeling: *Clarke* 27138A & F(K), *Gamble* 2421A (K) &

Badamtan, Aug. 1902, *Lace* s.n. (E); *Gamble* 2234A (K); Calcutta, *King* s.n. (Hort. Kew 1879) (K). Assam: *Jenkins* 26 (K). Himachal Pradesh: Sani, 8 Oct. 1890, *Watt* s.n. (E). Harayana: *Drummond* 25342 (K). Uttar Pradesh: Mussoorie, *Duthie* s.n. (DD); Dehra Dun: *Banwari Singh* 49 (FHO), *Gamble* 23915 (K), *Haines* 2614 (K), 5 Aug. 1897, *Mackinnon* s.n. (CAL), 13 Sept. 1955, *Nautiyal* s.n. (DD) & *Umrao Singh* 386 (Nat. Herb. Islamabad); *Edgeworth* 157 (K); *Lyer* 54 (FHO); *Sahni* 21609 (DD); Bahrai, 20 June 1920, *Sri Ram* s.n. (DD). Andhra Pradesh: *Balakrishnan* 673 (CAL) & 10883 (MH). Bihar: *Haines* 604 (K). Orissa: *Mooney* 2686 (K).

One collection (Burma, Maymyo, 1925, *Blandford* 1561 (DD)) is stated to have white flowers but otherwise closely resembles this species. In the absence of fruit it cannot be definitely stated whether this is merely a colour variant or a new species from this rather under-collected region. Another collection (Assam, Mergui, *Griffith* s.n. (K)) has rather small narrow leaves more similar in size to those of *M. atropurpurea*, but is probably referable to this species.

EXTERNAL DISTRIBUTION. Laos; Vietnam; Thailand; Philippines; ?Moluccas.

HABITAT. Forests and river-valleys, 300–1,200 m.

The other two varieties occur in Hong Kong (var. *hongkongensis*) and Hainan and Vietnam (var. *hainanensis*). See Wilmot-Dear (1984: 45) for summary of distinguishing characters.

There is taxonomic confusion associated with the name *M. imbricata* since Baker (1876) cited specimens of two distinct species in his description, as well as annotating with this name several other collections of each (Hooker, cited by Baker, collected both species). This confusion is perpetuated in subsequent literature; although most references to '*M. imbricata*' concern areas from which collections of only *M. nigricans* have been seen by me, the ranges of the two species overlap and in nearly all cases it is impossible from the descriptions given to be certain which taxon the authors had. The two are, admittedly, very similar except as regards fruit. The only collection for which a number is mentioned by Baker is *Wallich* 5623c, which is not *M. nigricans* (Lour.) Steud. This collection has therefore been selected as the lectotype of *M. imbricata* DC. ex Bak.

5. *Mucuna imbricata* DC. ex Bak. in Hook. f., Fl. Brit. Ind. 2: 185 (1876). Type: Bangladesh: Sylhet, *Wallich* 5623c p.p. (lectotype K! selected here, see note above; isolectotype BM!).

?*Carpopogon imbricatum* Roxb., Hort. Beng.: 54 (1814); nom. nud.

Stizolobium imbricatum (DC. ex Bak.) O. Kuntze, Rev. Gen. Pl. 1: 208 (1891).

Climber, large and woody; stems and petioles glabrescent or with sparse to abundant adpressed pale hairs. *Stipules* very early deciduous, narrowly triangular, up to 3 mm long, rather chartaceous with hairs as stem. *Leaves* and leaflets similar to those of *M. nigricans* but usually broad, acumen short; lateral leaflets markedly asymmetric, abaxial $\frac{1}{2}$ often more than twice as wide as adaxial; lateral veins (4–)5–6; stipels terete, fairly robust, 2–4 mm long. *Inflorescences* sometimes arising from old wood, up to 16 cm long with c. 7 sidebranches all arising in upper $\frac{2}{3}$ of axis, secondary branches completely reduced to small nodes, pedicels \pm 1 cm long, axis and pedicels with abundant golden adpressed hairs and scattered reddish deciduous irritant bristles; bracts

and bracteoles not seen. *Calyx* pubescent outside as the axis but bristles more abundant, inside with dense longer darker hairs showing outside as a fringe around the margins; tube fairly broadly cup-shaped, 7–8 × 10 mm, lowest tooth 6–12 mm, 2 laterals 4–5 mm long, all 2–3 mm wide and long-acuminate, upper lip usually exceeding lateral teeth and often almost equalling lowest, acute or mucronate at tip. *Corolla* dark purple; standard 3 cm long, broadly shallowly cleft (to 1 mm) at apex, basal auricles minute, up to 1 mm long; wings fairly narrow, 4–4.5 × 1 cm, slightly upcurved and ± acute at apex, basal claw 7 mm and auricle 2 mm long, both slightly pubescent; keel ± equalling wing in total length and in claw and auricle length. *Fruit* thickly leathery, 2-seeded, broadly oblong-elliptic with margins, especially upper, convex, almost twice or up to 3 × as long as broad, 9.5–11.5 × 3.5–7 cm (excluding marginal wings), laterally flattened 2–2.5 cm in thickness, with sparse short fine red-gold hairs and reddish deciduous irritant bristles, also with 6–12 fairly robust lamellae up to 1 cm broad on each face, these running ± parallel obliquely across pod from one or other margin, each bifurcated to give “T” shape in cross-section and all terminating at middle of pod to give a longitudinal mid-line bordered on each side by a row of rounded tips of lamellae; margins of lamellae ± flat or upcurved, visible even in young fruit amongst dense bristle-covering; internal septa between seeds thin but rigid, often visible externally as slight indentations; each margin of pod with pair of very wide (1–1.5 cm) crenate wings, these and lamellae with coarse reticulate pattern of raised lines. *Seeds* pinkish to dark reddish brown with black mottling, very large, 2.7–3.5 × 2.4–2.7 × 0.9–1.4 cm, oblong, flattened; hilum black, encompassing a little over ½-circumference, up to 3 mm wide. (Fig. 2).

Endemic to the NE of the subcontinent and to Sri Lanka. (Map 2).

BHUTAN. Sarbhag Dist., 10 March 1982, *Grierson & Long* 3647 (E, K).

BANGLADESH. Sylhet: Chuna, *Wallich* 5623c *pro parte* [mixture with *M. pruriens*] (isolectotype BM; lectotype K); Chuna, 28 Aug. 1850, & Telain, 24 Nov. 1850, *Hooker* s.n. (K), & *Hooker* 35 (K) & *Hooker & Thomson* s.n. (BM).

BURMA. Mytkyina, Irrawaddi, 11 Oct. 1945, *Belcher* 769 (K).

INDIA. Arunachal Pradesh: Dihang Valley, Abur Hills, 13 Feb. 1928, *Kingdon Ward* 7889 (K). Manipur: Chamoo, 14 Jan. 1882, *Watt* 5175 (E, K). Nagaland: Soropung, Dec. 1907, *Meebold* 7261 (K); Meghalaya: Rongram, 1962, *Deb* 29206 (ASSAM).

SRI LANKA. C. Prov., Matale Dist., 27 March 1971, *Robyns* 7327 (K).

HABITAT. Forests, woodland margins, river valleys; 200–400 m.

This species rather closely resembles *M. interrupta* Gagnep. As mentioned elsewhere (Kew Bull. 39: 47 (1985)) leaves of the latter are relatively narrower and fruits, although superficially extremely similar, have rather more robust, narrow, hardly or not undulating wings and lamellae, the wings rarely exceeding 7 mm; flowers are quite distinct, much larger, keel 5–5.7 cm long.

6. *Mucuna atropurpurea* (Roxb.) DC. ex Wight & Arn., Prodr. 1(2): 254 (1834); Bak. in Hook., Fl. Brit. Ind. 2: 186 (1876); Trimen, Handb. Fl. Ceylon 2: 61 (1894); Cooke, Fl. Bombay Pres. 1: 365 (1903); Duthie, Fl. Upper Gang. Plain 1: 236 (1905); [Osmaston, For. Fl. Kumaon; 171 (1927); stated as absent]; [Babu, Herb. Fl. Dehra Dun: 154 (1977); stated as wrongly recorded from area]; Matthew, Fl. Tamil Nadu Carnatic: 194 (1981). Type: Eastern

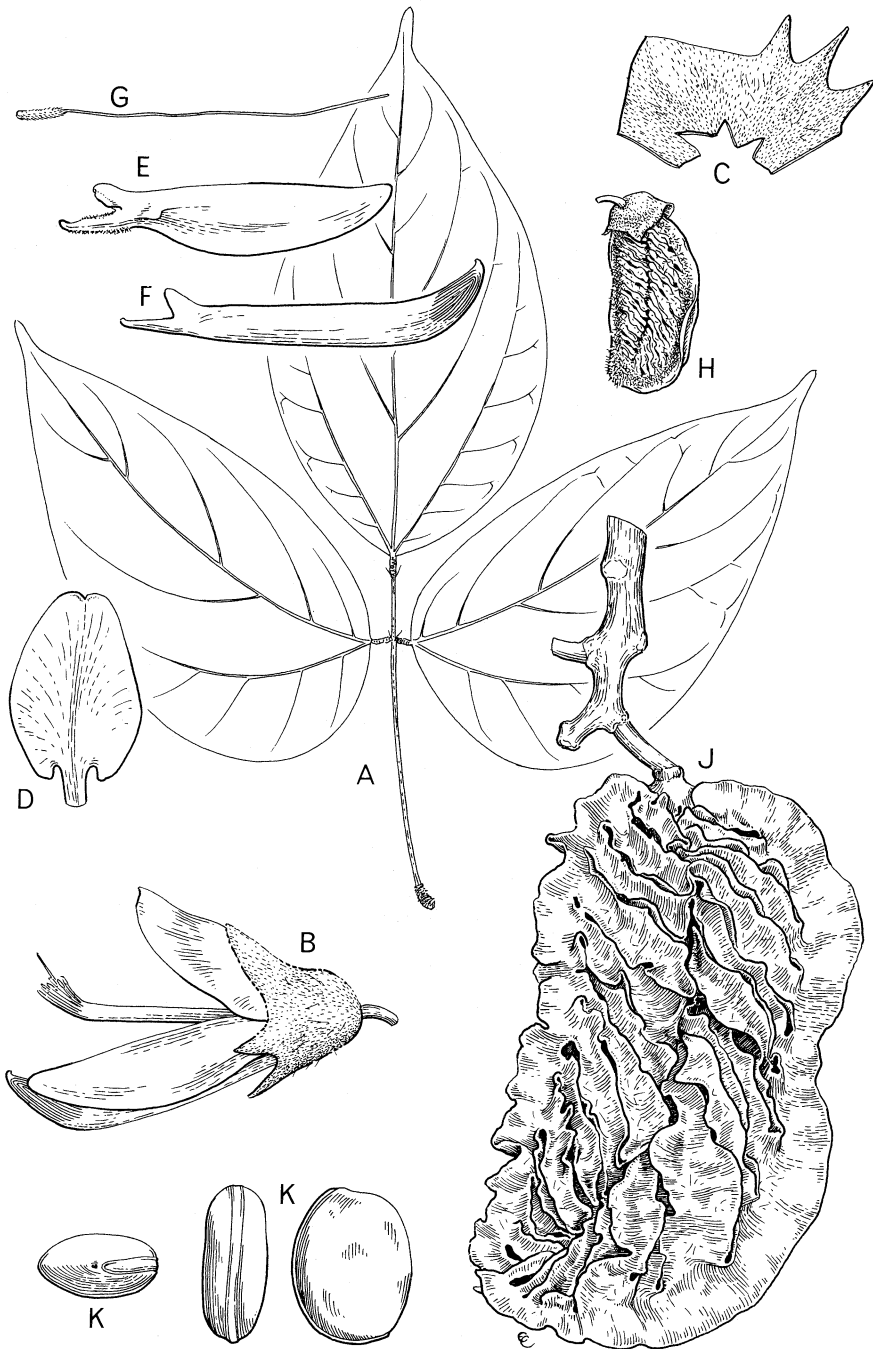


FIG. 2. *Mucuna imbricata*. **A** leaf; **B** flower; **C** calyx opened out; **D** standard; **E** wing; **F** keel; **G** pistil; **H** young fruit; **J** mature fruit; **K** seed. **A** from *Hooker* 35; **B-H** from *Wallich* 5623C (type); **J** from *Watt* 5175; **K** from *Hooker* s.n. (1850). **A, H-K** $\times \frac{1}{2}$, **B-G** $\times 1$. Drawn by Eleanor Catherine.

India, 1813, *Roxburgh* s.n. (holotype BM!). *Carpopogon atropurpureum* Roxb., [Hort. Beng: 54 (1814) &] Fl. Ind. 3: 287 (1832). *Stizolobium atropurpureum* (Roxb.) O. Kuntze, Rev. Gen. Pl. 1: 208 (1891).

Climber; often large and woody, up to 8 m long and 5 cm diam., bark reddish, wrinkled; stem and petioles glabrous or with few short adpressed pale hairs. *Stipules* not seen. *Leaves* up to 28 cm long; terminal leaflet 7–13 × 3–8.5 cm, elliptic, usually narrow, rarely less than twice as long as wide, narrowing abruptly at apex into short acumen up to 8 mm long and fairly wide (to 5 mm) throughout its length and terminating abruptly in mucronate tip, rounded or slightly cuneate at base; lateral leaflets of similar length, not markedly asymmetrical, abaxial half $1\frac{1}{4}$ – $1\frac{1}{2}$ × as wide as adaxial, expanded lower part rounded and truncate at base; lateral veins 3–5, thinly prominent, arising at an acute angle from midrib and curving slightly upwards with basal pair extending well into upper $\frac{1}{2}$ of leaflet and second pair almost to tip, near margin all veins curving markedly and becoming indistinct, secondary veins thinly prominent, reticulation visible; thinly coriaceous or membranous, often drying rather light green or pale brown, smooth almost shiny above with sparse pale hairs as stem both sides; stipels filiform, up to 2 mm. *Inflorescences* 8–30 cm, sometimes branched near base, side-branches up to 8, arising from upper $\frac{1}{3}$ – $\frac{1}{2}$ of axis; secondary branches completely reduced or up to 6 mm, individual pedicels rather long, 1.3–1.8 cm; axis and especially pedicels with adpressed hairs as stem and reddish-brown irritant bristles; bracts not seen, bracteoles very early deciduous, narrowly obovate or strap-shaped up to 10 × 3 mm, rounded at apex and base and with sparse short adpressed hairs. *Calyx* pubescent outside like the pedicels but more densely inside with longer orange hairs, these visible outside as distinct darker fringe around margins of lobes; tube fairly broadly cup-shaped, 4–8 × 8–13 mm, 3 lower teeth large and rather broad throughout length with rounded sometimes acute-tipped apex, lowest 4–8 mm, laterals usually slightly shorter, upper lip often equalling longest lobe and with broadly rounded or very slightly cleft apex. *Corolla* reddish purple; standard 3–3.5 cm long, slightly over $\frac{1}{2}$ keel length, apex slightly cleft, basal auricles up to 2 mm long; wings fairly wide, 5.2–6.5 × 1–2 cm, apex narrowly rounded, basal claw 6–7 mm and auricle 2 mm long; keel ± equalling wing in length, basal claw 6 mm and auricle 2.5 mm long. *Fruit* thickly leathery, 2-seeded, oblong, upper edge more convex but both margins slightly indented between seeds, 6–10 × 3–4.5 cm, much flattened laterally, up to 1.2 cm in thickness; surface with short fine red pubescence and dense covering of long red erect irritant deciduous bristles, also with 8–12 fairly thick and robust lamellae running ± parallel obliquely across pod from one or other margin and so close that pod surface invisible between, each lamella bifurcating to give “T”-shape in cross-section and all terminating at middle of pod to give longitudinal “mid-line” bordered on each side by a row of rounded tips of lamellae; margins of lamella somewhat revolute, lamellae up to 3 mm wide; internal septa between seeds thin but rigid, not visible externally; each margin of pod with pair of narrow slightly inrolled wings 2–5 mm wide. *Seeds* black, ± 2 × 1.8 cm (slightly immature), oblong or almost discoid in outline, flattened; hilum black, encompassing just over $\frac{1}{2}$ circumference. (Fig. 3).

Endemic to Peninsular India and Sri Lanka. (Map 3).

INDIA. ?Karnataka: Maisar, Chickenalli, Nov. 1908, *Meebold* 10061 (E). Tamil Nadu: Coonoor to Burlyar, Nilgiris, 30 Dec. 1902, *Barber* 5381 (K);

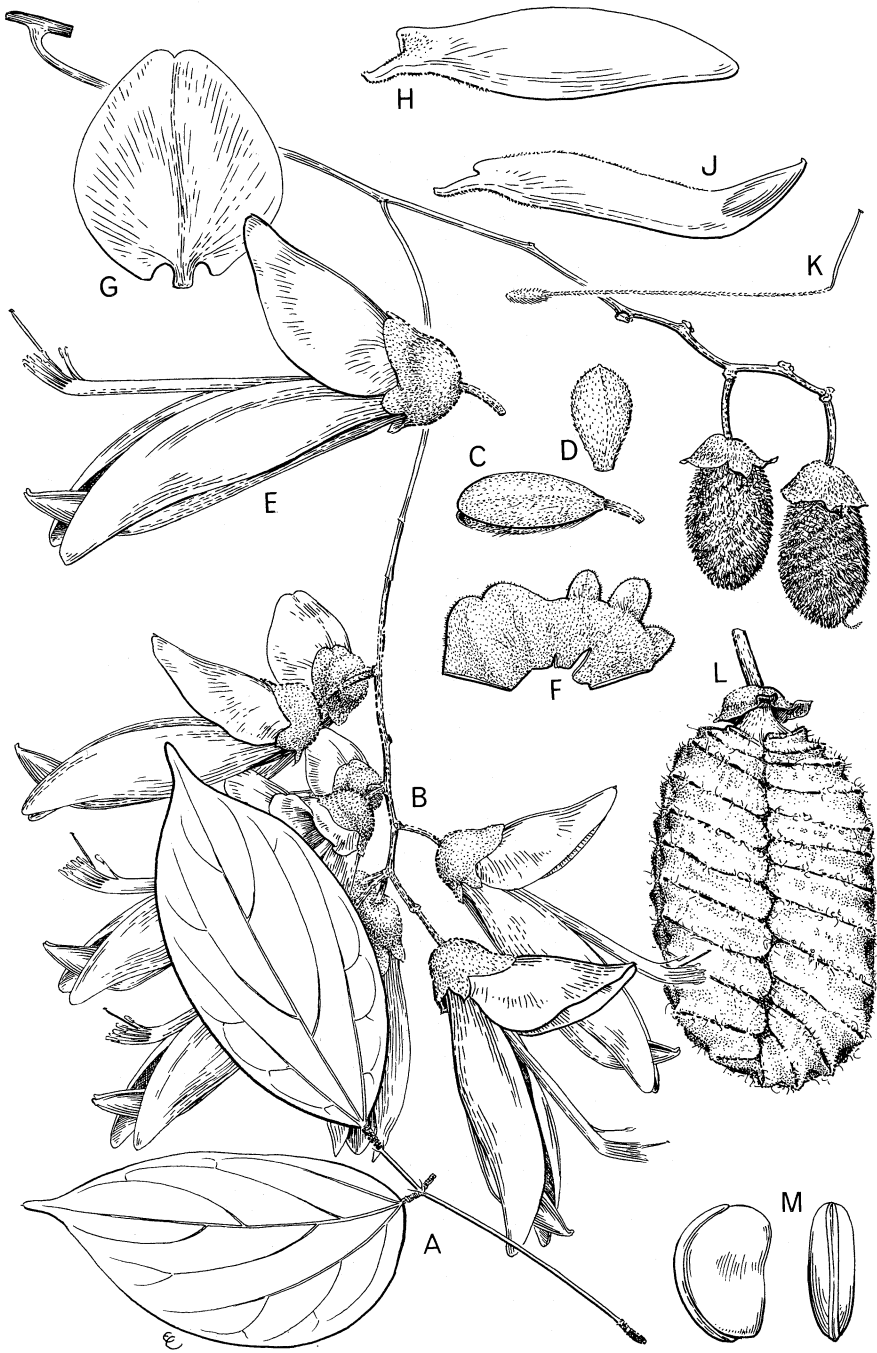
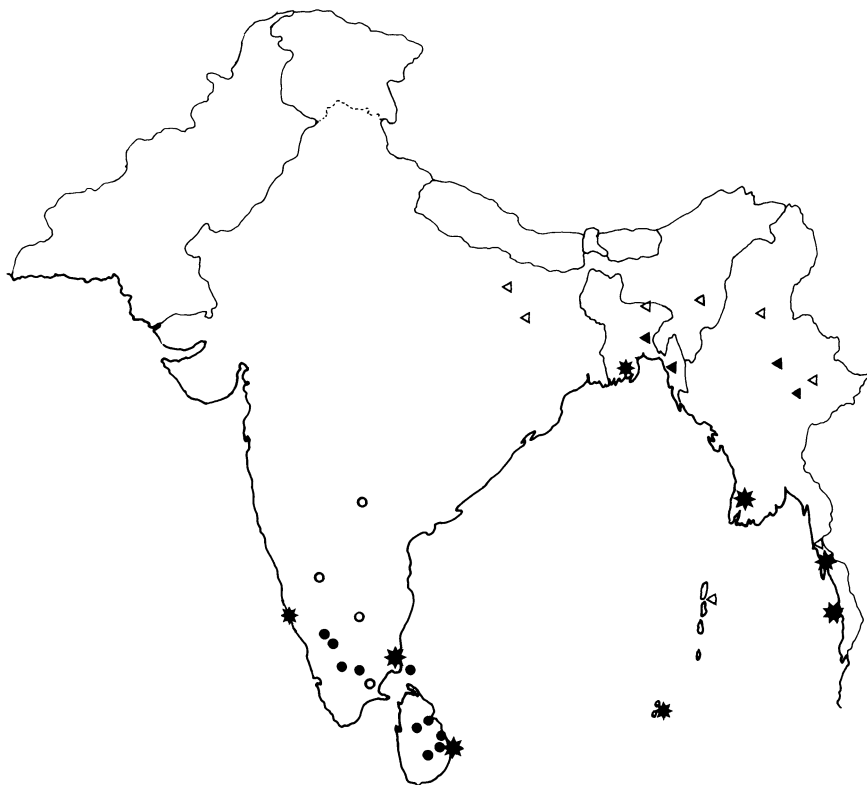


FIG. 3. *Mucuna atropurpurea*. A leaf; B inflorescence and young fruits; C bud with bracteole; D bract; E flower; F calyx opened out; G standard; H wing; J keel; K pistil; L fruit; M seed (immature). A from Robyns 7327; B, E from Wight 751; C, D from Thomson s.n.; F-K, M from Wight 741; L from Robyns 7327. A, B, L $\times \frac{1}{3}$; C, D $\times 2$; E-K, M $\times 1$. Drawn by Eleanor Catherine.



MAP 3. Distribution of *Mucuna gigantea* *; *M. bracteata* ◄; *M. atropurpurea* ● in the Indian subcontinent & Burma. (* ◄ ○ indicate exact locality uncertain.)

Kodaikanal Ghat, & Anamalais, 1897, *Bourne* 2561 & 721 (K); Anamalai Slope, *Joseph* 13268 (CAL); Kanya Kumari Dist., 5 Feb. 1972, *Sharma* 39954 (MH); Ramnad Dist., 13 March 1970, *Vajravelu* 33/22 (MH); Dindigul, *Wight* s.n. (E) & 751 (BM, CGE, E, K); Nagapatam, 1831, *Wight* s.n. (E). ?Tamil Nadu: 1813, *Roxburgh* s.n. (holotype BM); *Thomson* 83 (K); *Wallich* 5620 (BM, K); *Wight* 746 (K) & (1836) 254 (E).

SRI LANKA. C. Prov., Trincomalee: Batticaloa, *Thwaites* CP. 148 (BM, K, PDA) & *Jayasuriya* 665 (PDA); Ritigala, 20 Jan. 1973, *Jayasuriya* 1036 (K; PDA); Galboda, *Jayasuriya* 303 (PDA); Baduluwela, *Jayasuriya* 2059 (PDA); Amparai, *Maxwell* 751 (PDA); Naula, *Robyns* 7327 (PDA).

HABITAT. 400–1000 m.

I am suspicious of the record (*Duthie* 1905 repr. 1960) in Uttar Pradesh; although the description would fit this species, it seems likely that its mention here relates to the same misidentification as that appearing in *Kanjilal* (1911) where material, from description given almost certainly of *M. nigricans*, is recorded as *M. atropurpurea* but subsequently corrected in *Gupta's* revised edition (1928) to *M. imbricata*. I have seen no material, nor is any elsewhere recorded, from Central or Northern India.

7. *Mucuna gigantea* (*Willd.*) *DC.*, *Prodr.* 2: 405 (1825); *Wight & Arn.*,

Prodr. 1(2): 254 (1834); Bak. in Hook. f., Fl. Brit. Ind. 2: 186 (1876); Burck in Ann. Jard. Buitenzorg 11: 187 (1893); Trimen, Handb. Fl. Ceylon 2: 62 (1894); Cooke, Fl. Bombay Pres. 1: 365 (1903); Prain, Bengal Pl. 1: 400 (1903); Gagnep. in Fl. Indo-Chine 2: 318 fig. 33 7-14 (1916); Ohashi & Tateishi in J. Jap. Bot. 51(6): 164 fig. 2, 3 (1976); Tateishi & Ohashi in Bot. Mag. Tokyo 94: 92 & fig. 1 (1981) which see for detailed list of refs. and syns.; Wilmot-Dear in Kew Bull. 39: 56 (1984). Type: Rheede, Hort. Malab. 8: 63 t. 36 (1688).

subsp. **gigantea**; Ohashi & Tateishi tom. cit.: 164 f. 2 (1976).

Dolichos giganteus Willd., Sp. Pl. 3: 1041 (1802).

Carpopogon giganteum (Willd.) Roxb., Hort. Beng.: 54 (1814).

Stizolobium giganteum (Willd.) Spreng in Linn., Syst. ed. 16, 4(2), Cur. Post: 281 (1827).

Mucuna corymbosa R. Graham ex Wall. Num. List 5622; *nom. nud.*

For description see Wilmot-Dear (1984: 56-57). (Map 3).

BANGLADESH. Sundarbans: *Sandom* 85, & 20 Sept. 1809, *Wallich* 5619 (K).

BURMA. South: Mergui, *Griffith* in Herb. *Wight* s.n. (K); Bassein Dist., Chaung Tha Is., 12 April 1906, *Lace* 3028 (E, K). Tavoy, March 1911, *Meebold* 14107 (K) & 5 Oct. 1827 *Wallich* 5622 ([?Wight] 394) (BM, K).

INDIA. Tamil Nadu. Nagapatam: Nov. 1820 & 1821, *Wight* 753 (*Graham* 3) (BM, E) & Milkagunny, 1830, *Wight* s.n. (E). Kerala/Tamil Nadu: *Wight* s.n. (K). Andaman Is.: South: Way to Sipighat, 25 Nov. 1978, *Basu* 7065 (CAL) & *Kurz* s.n. (K); Middle Andaman, Rongat, March-April 1934, *Kirat Ram* 3813 (DD); 20 Feb. 1915, *Parkinson* 354 (K); Long Is., 22 Jan. 1959, *Thothathri* 9121 (MH). Gt. Nicobar Is.: 5 Nov. 1979, *Hore* 7750 (CAL).

SRI LANKA. Batticaloa, *Thwaites*, C.P. 3587 (PDA); *Walker* 1407 (E).

EXTERNAL DISTRIBUTION. Japan; Malesia; Australia; Polynesia.

HABITAT. Forest edges, thickets, often coastal; low altitude.

B. Subgenus STIZOLOBIUM (P.Br.) Prain

Annual or somewhat woody; pods sometimes longitudinally ribbed; seeds compressed, oblong-ovoid, with a very short hilum surrounded by a conspicuous rim-aril.

8. *Mucuna bracteata* DC. ex *Kurz* in J. Asiatic Soc. Beng. 42: 231 (1873); Bak. in Hook. f., Fl. Brit. Ind. 2: 187 (1876); Kanjilal & Das, Fl. Assam: 68 (1938); Deb, Fl. Tripura State 1: 178 (1981); Wilmot-Dear in Kew Bull. 39: 59 (1984) which see for list of syns. Types: Burma: Pegu, Martaban, Ava, ?*Kurz* s.n. (syntypes ?CAL, not found).

Carpopogon bracteatum Roxb., Hort. Beng.: 54 (1814), *nom. nud.*

Mucuna exserta C.B. Clarke ex C.E.C. Fisher in Kew Bull.: 5 (1925); Kanjilal & Das, Fl. Assam 2: 68 (1938). Types: Assam: Khasia, *Clarke* 37300A, & Garo Hills, *Clarke* 43057A (syntypes K!).

Climber up to 10 m. Inflorescence side-branches 10 or more, often many, often crowded in apical $\frac{2}{3}$ of inflorescence; axis with numerous bracts or scars throughout length and some (usually many) below lowest side-branches. For full description see Wilmot-Dear (1984: 59-60). (Map 3).

BANGLADESH. Thonna to Radjaori, ?collector (K, P); Chittagong, Jaldi, 25 March 1921, Cowan 2261 (E).

BURMA. N: Fort Stedman, Dec. 1892, *A. Huk* s.n. (BM) & Taping, Jan. 1913, *Forrest* 9502 (E); Katha, Jan. 1915 & 10 Jan. 1915, *Haines* s.n. (E); Singon, 29 Dec. 1914, *Haines* s.n. (E); Dec. 1914, *Haines* s.n. (E). Mandalay Dist., Maysmyo, 4 Jan. 1925, *Parker* 2377 (DD); Taunggyi, 22 Dec. 1957, *McKee* 5922 (K).

BURMA/ANDAMANS: "Tenasserim & Andamans", *Helger* 1702 (K).

INDIA. W Bengal: W Duars, Buxar, 1 Feb. 1879, *Gamble* 6670A (K). Meghalaya: Khasia: 21 Feb. 1885, *Clarke* 37253A (K), *Deha* 20479 (ASSAM), *Griffith* 513 (K) & *Hooker & Thompson* s.n. (K); Garo Hills: Tuva, Feb. 1885 & Feb. 1886, *Clarke* 37300A (K) & 43057A (K) & B (BM) & Nenkra, Nov. 1929, *Parry* 1351 (K). Tripura: Shanmura, Tipperah Hill, 27 Dec. 1914, *Debbarmann* 408 (CAL). Mizoram: Lushai, March 1928, *Parry* 651 (K). Manipur: Neechugard, Feb. 1906, *Meebold* 5338 (K); Jomteik Shaub, Jan. 1908, *Meebold* 8069 (E). Bihar; Moongher, 28 Nov. 1885, *Clarke* 42214 (K). Unlocalised: "Assam" [Assam/Meghalaya]: 1839, *Masters* 249 (K); Herb. *Lambert* s.n. [? *Roxburgh*] (CGE, K).

EXTERNAL DISTRIBUTION. China (S & W); Thailand; Laos; Vietnam.

HABITAT. Climbing on vegetation in forests and thickets or open ground; 200–1700 m.

9. *Mucuna pruriens* (L.) DC., Prodr. 2: 405 (1825); Bak. in Hook. f., Fl. Brit. Ind. 2: 187 (1876); Trimen, Handb. Fl. Ceylon 2: 62 (1894); Cooke, Fl. Bombay Pres. 1: 365 (1903); Prain, Bengal Pl. 1: 400 (1903); Duthie, Fl. Upper Gang. Plain 1: 237 (1905); Haines, Forest Fl. Chota Nagpur: 324 (1910); Parker, Forest Fl. Punjab: 188 (1918); Ali in Nasir & Ali, Fl. W. Pakistan 100: 238 (1977); Babu, Herb. Fl. Dehra Dun: 154 (1977); Deb, Fl. Tripura State 1: 178 (1981); Matthew, Fl. Tamil Nadu Carnatic: 194 (1981) & Ill. Fl. Tamil Nadu Carnatic Pl. 207 (1982); Wilmot-Dear in Kew Bull. 39: 61 (1984) which see for further syns. Type: Indonesia, Amboina, Rumphius, Herb. Amb. 5 t. 142 (1750).

Dolichos pruriens L. in Stickman, Diss. Herb. Amb.: 23 (1754) & Syst. Nat., ed. 10: 1162 (1759).

Stizolobium pruriens (L.) Medic. in Vorles., Churpf. Phys. Ges. 2: 399 (1787).

Mucuna prurita Hook., Bot. Misc. 2: 348 (1831) & Bot. Mag. 82: t. 4945 (1856);

Wight & Arn., Prod. 1(2): 255 (1834); Dalz. & Gibs., Bombay Fl.: 70 (1861); Gupta, For. Fl. Chakrata, Dehra Dun, Saharanpur, U.P., (rev. ed. of Kanjilal, Fl. Siwalik & Jaunsar): 177 (1928); Kanjilal & Das, Fl. Assam 2: 67 (1938); Haines, Bot. Bihar Orissa 3: 283 (repr. ed. 1961); Maheshwari, Fl. Delhi: 129 (1963); Thothathri in Materials for Fl. Bhutan in Rec. Bot. Surv. Ind. 20(2): 79 (1973); *nom. illegit. superfl.*; type as for *M. pruriens*.

Carpopogon pruriens (L.) Roxb., Fl. Indica 3: 283 (1832).

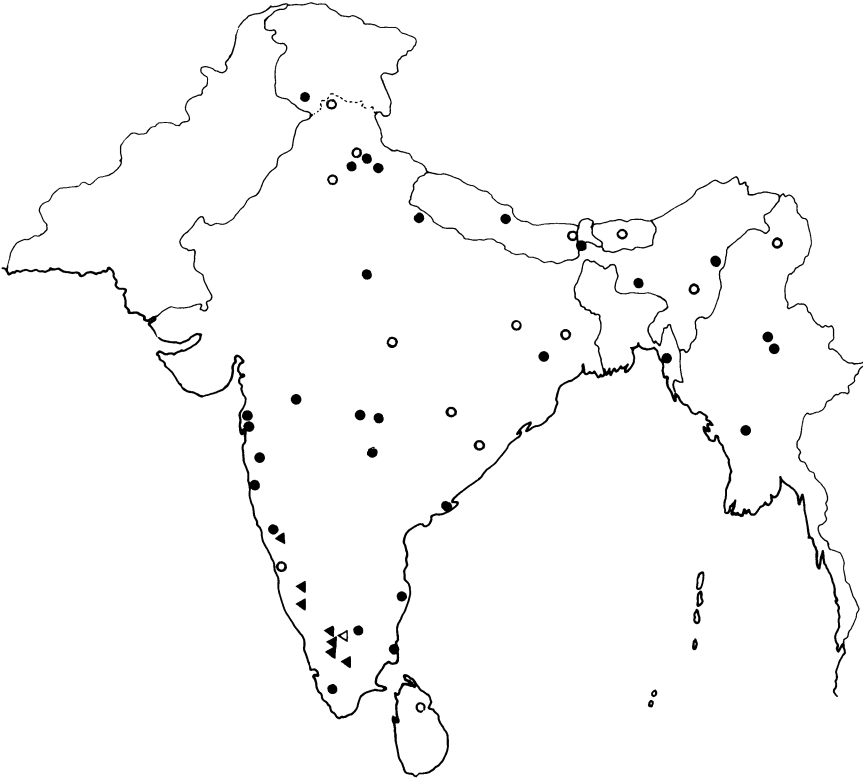
?*Mucuna minima* Haines in Journ. As. Soc. Beng. new ser. 1919, 15: 313 (1920)

& Bot. Bihar Orissa 3: 284 (1922). Type: India, Orissa, Sambalpur, ?*Haines* s.n. (?ubi). See note under this name below, p. 46.

Climber, herbaceous or semi-woody, often up to 4 m; stem finely longitudinally grooved, glabrous or variously hairy, petioles similarly hairy. *Leaves* of very varying sizes up to 46 cm long; stipules very deciduous, 3–4 × 1 mm, hairy as stem; terminal leaflet (8.5–)14–16 × (4.5–)8–10 cm, elliptic or rhombic-ovate, rather wide, length $1\frac{1}{2}$ – $1\frac{3}{4}$ × width, rounded ± acute at apex



FIG. 4. *Mucuna pruriens* var. *hirsuta*. A habit; B bracteole; C flower; D calyx opened out; E standard; F wing; G keel; H pistil; J fruit; K seed. A, B from Bourne 188; C-H from Bourne 2562; J, K from Bourne 2563. A, J $\times \frac{1}{3}$, B, K $\times 2$, C-H $\times 1$. Drawn by Eleanor Catherine.



MAP 4. Distribution of *M. pruriens* var. *pruriens* ● & var. *hirsuta* ▲ in the Indian subcontinent & Burma. (○ ◁ indicate exact locality uncertain.)

or narrowing into short (to 5 mm) often mucronate acumen, rounded at base; lateral leaflets of similar length or (var. *utilis*) often markedly larger than terminal, to 20 cm long, very asymmetrical, abaxial half 2–3 × as wide as adaxial with expanded lower part ± truncate or rarely cordate at base; lateral veins 5–8, curving and running into margin, prominent both sides, coarse and often fine reticulation thinly so; fairly thinly chartaceous or membranous, or (var. *hirsuta*) thickly chartaceous to coriaceous, often drying slightly paler beneath than above, variously hairy or glabrous; stipels terete, fairly robust, 4–5 mm long. *Inflorescences* arising from axils, up to 34 cm long*, side-branches few–14, spaced throughout length or in apical $\frac{2}{3}$ of axis and then no bracts or scars on lower flowerless part; secondary branches reduced, individual pedicels 2–4 mm long with dense ± silky adpressed pale hairs or longer crisped orange hairs, often also with scattered reddish bristles, axis similarly hairy; bracts and bracteoles deciduous before flowers mature, linear-lanceolate, lanceolate or narrowly, rarely broadly, ovate, acute at apex, 5–9 × 1–3 mm, hairy as axis. *Calyx* with dense short adpressed pale or light brown hairs both sides and often also longer pale or brownish deciduous bristles; tube broadly cup-shaped ± 5 × 10 mm; 2 lateral teeth broadly triangular, 2–4 × 1.5–3.5 mm, lowest narrowly triangular 6–10 × 2–3 mm usually 2–3 × as long as laterals and usually longer than tube; upper lip slightly exceeding laterals with rounded or

*In Kew Bull. 39: 61 (1984) wrongly given as '3–4 cm'.

acute tip. *Corolla* purple or all, or only keel, white; standard 1.6–2.5 cm long, $\frac{1}{2}$ – $\frac{2}{3}$ keel length, apex very slightly cleft, basal auricles hardly visible, pubescent in claw region; wings 2–4 × ± 1.2 cm, rounded at apex, shorter than or ± equalling keel, basal claw 4 mm and auricle 1 mm long, pubescent in claw region; keel 2.8–4.2(–4.5) cm long, basal claw 5 mm and auricle 1–2 mm long. *Fruit* fleshy, 3–6-seeded, either oblong-linear and torulose, slightly curved and narrowing towards acute down-curved or hooked apex, or else ± sigmoid and misshapen often greatly swollen around seeds, in all cases laterally flattened, 5–9 × 0.8–2 × 0.5 cm with very dense covering of pale, orange or dark brown irritant deciduous bristles or sparse to dense shorter fine silky pale hairs; septa papery and very thin, on linear pods visible externally as obliquely transverse grooves; margin ± thickened and grooved along sutures, sometimes ridged; surface sometimes irregularly longitudinally wrinkled. *Seeds* of various colours, ellipsoid, similar to those of *M. bracteata*, (1–)1.3–1.7(–2) × (0.7–)0.9–1.3 × (0.3–)0.4–1 cm; hilum encompassing $\frac{1}{3}$ circumference, 6 mm long with raised rim-aril forming border.

a) var. pruriens

Stems, stipules and petioles glabrous or with sparse fine pale hairs and often longer coarser darker hairs. *Leaflets* usually narrowing to acute apex, thinly chartaceous or membranous, glabrescent above or with abundant fine pale hairs especially on veins, similarly but more densely hairy (rarely silky-hairy) beneath. *Pedicels* with dense ± silky adpressed hairs and often scattered deciduous reddish bristles, axis similarly (more sparsely) hairy; bracts fairly narrow, 3–6 × as long as wide. Calyx with fine silvery indumentum and often also sparse deciduous red-brown bristles (finer than those on fruit). *Corolla* dark purple; standard 1.7–2.5 cm long, wings 3.5–4 cm, keel 3.8–4.2 cm. *Fruit* narrowly oblong-linear, usually distinctly curved into 'S' shape, up to 1 cm broad with very dense covering of golden or brown irritant bristles; septa visible indistinctly but other surface details invisible beneath dense bristle-covering. *Seeds* fawnish-brown or blackish, aril orange. (Map 4).

NEPAL. Illam–Jog Mai, 8 Dec. 1963, *Hara et al.* 6301658 (BM, E); Dajarhot, 17 Oct. 1952, *Polunin et al.* 5795 (BM); C, Dasondi Khola, 14 Oct. 1967, *Stainton* 6051 (BM).

SIKKIM/INDIA (W Bengal). 10 Oct. 1912, *Cave* s.n. (CAL); Dongbo above Siwalik, 12 Dec. 1875, *King* s.n. (CAL); *Gamble* 2234, 2437 & 1760A (K).

BANGLADESH. *Hooker & Thompson* s.n. (K). Chittagong, 5 Feb. 1873, *Clarke* 19552 (BM).

BURMA. Kachin Hills, rec. March 1898, *Shaik Mokim* s.n. (CAL). Maymyo: Mg. Kan 18153 (DD) & *Lace* 4348 & 5524 (E, K). S Shan States, *MacGregor* 1144 (E); Irrawaddi: *Abel* 5616 & *Wallich* 5616G (K). Khinda, *Lace* 2617 (E). Minko, *Shaik Mokim* 608 (BSI).

INDIA. Jammu & Kashmir: Jammu, *J. Thomson* 11/46 (K). W Bengal: *Gamble* 2234 (K). Assam: *Jenkins* s.n. (DD, K) & 19 (K). Meghalaya: Khasia, *Hooker & Thompson* 16 (K); Garo Hills, *Parry* 1084 (K). Manipur: *Bullock* 615 (K). Nagaland: Lacham, *Bar* 6744 (K). Uttar Pradesh: *Bahadur* 1104 (DD); *Edgeworth* 156 (FHO; K); Dehra Dun: 1895, *Mackinnon* s.n. (CAL) & *van der Maesen* 2987 (K); 12 May 1920, *Rao* s.n. (DD); *Sahni* 21431 (DD); *Banwari Singh* 50 (FHO). Bihar: *Kerr* 2583 (BM); *Panigrahi* 11686 (CAL); *Watt* 8482 (E). Madhyar Pradesh: *Joseph* 13493 (MH); *Kenodia*, BSI 82224 (BSI). Orissa:

Sambalpur: *Mooney* 1985 (DD, K) & 2932 (K). Maharashtra: *Bvenkera Reddi* BSI 9.3336 (BSI); *Hemadri* BSI 120600 (BSI); *Mahajan* BSI 13412 (BSI); *Satyanarayan* BSI 9467 (BSI); *Sinclair* 4529 (E); *Sedgewick & Bell* 7677 (K); *Sethi & Nege* 25718 (DD); Concan, *Stocks* s.n. (E). Andhra Pradesh: *Barber* 5253 (K). Kerala: *Wight* 743 (K). Tamil Nadu: Tranquebar, 1775–1776, *Jesuit Fathers* s.n. (BM); *Vajravelu* 23587 (CAL). S India unlocalised: *Wight* 755 (BM); [?Kerala], Cuddapa Dist., *Beddome* 2177 (BM); ‘Malabar, Concan, etc.’ *Stocks & Law* s.n. (BM); Southern Maratha & N Canara, *Young* s.n. (BM).

SRI LANKA. *Jayasuriya* 532 (PDA); *Dombois* 6708 & 3008 (PDA).

EXTERNAL DISTRIBUTION. Widely distributed: tropical Africa; Madagascar; Asia; tropical America.

HABITAT. Wide-ranging: from open rocky ground to forest; low altitude to 1200 m.

b) var. *hirsuta* (*Wight & Arn.*) *Wilmot-Dear* stat. nov.

M. hirsuta *Wight & Arn.*, *Prod.* 1(2): 254 (1834); *Bak.* in *Hook. f.*, *Fl. Brit. Ind.* 2: 187 (1876); *Fyson*, *Fl. S. Indian Hill Stations*: 166 & t. 12 (1932); *Matthew*, *Fl. Tamil Nadu Carnatic*; 194 (1981). Type: Pen. Ind. Or., *Wight* 750 (holotype K!; isotype E!).

M. pruriens (L.) DC. f. *hirsuta* (*Wight & Arn.*) *Backer*, *Fl. Java* 1: 629 (1963) [not stated as present in Java]; *Babu*, *Herb. Fl. Dehra Dun*: 187 (1977).

Stem, stipules, petioles, inflorescence axis and pedicels with abundant or sparse but distinct indumentum of long crisped orange-brown hairs, shorter fine \pm adpressed hairs often also present. *Leaflets* always rhombic-ovate, often rather broadly rounded at apex (extreme tip acute or mucronate), rather thickly chartaceous or coriaceous and usually fairly small, 8–12(–15) \times 6–9(–11) cm; lower surface with silky and usually dense covering of adpressed golden hairs especially along veins which thus show as deeper orange lines. Bracts broadly ovate up to twice as long as wide; bracteoles rather late-deciduous, ovate-elliptic, 5–6 \times \pm 2 mm. *Corolla* dark purple, size as in var. *pruriens*. *Pod* linear, slightly torulose and not or hardly curved, down-curved slightly at apex, with dense covering of dark brown irritant deciduous bristles. *Seed* dark red-brown, aril and hilum blackish. (Fig. 4).

Endemic to W Peninsular India. (Map 4).

INDIA. Karnataka: Coorg: 1963, *Rao*, BSI 85488 & 97174 (BSI); Hassan Dist., 1969, *Saldhana* 15810 (K); N Kanara, 1925, *Sedgewick & Bell* 6991 (K). Kerala: Holeikal to Palghat, 24 Jan. 1852, *Cleghorn* s.n. (K); Anamalays [Anaimalai]: *Beddome* 2179 (BM) & ?collector, (MH); Wynaad: *Beddome* 2175 & 2176 (BM) & *Barber* 5622 (K); Iddiki Dist., 16 Nov. 1975, *Vivekananthan* 46680 (MH). Tamil Nadu: Pulneys: *Saulière* 537 & 471 (K) & *Bourne* 188, 2085, 2562 & 2563 (K); Coonoor, 2 July 1896, *Bourne* s.n. (K); Coimbatore Dist., *Subramanyam* 1529 (MH). Unlocalised: Kerala/Madras: *Walker* s.n. (K); *Wight* 750 (holotype K; isotype E).

HABITAT. Undergrowth in evergreen or moist deciduous forest; 500–1800 m.

The only character providing an absolute distinction between this and the typical variety is the very noticeable indumentum of long crisped hairs, as opposed to fine or coarse straight hairs, on stems, petioles and floral axes. The whole plant does generally present a somewhat different aspect since leaflets of var. *pruriens* are rarely densely silky hairy or broadly-rounded at the apex,

and pods are never straight, but it so closely resembles var. *pruriens* in all other respects that I do not feel justified in maintaining it as a distinct species.

c) var. **utilis** (*Wall. ex Wight*) *Bak. ex Burck* in *Ann. Jard. Buitenzorg* 11: 187 (1893); Haines, *Forest Fl. Chota Nagpur*: 325 (1910) & *Bot. Bihar Orissa* 2: 284 (1922) [as *M. prurita* var. *utilis*]; Wilmot-Dear in *Kew Bull.* 39: 63 (1984) which see for more detailed list of synonyms. Type not indicated.

Carpopogon niveum Roxb., [*Hort. Beng.*: 54 (1814) (nom. nud) &] *Fl. Ind.*; 3: 285 (1832). Type: Roxb. drawing no. 1601 (lectotype K!; Wilmot-Dear loc. cit. (1984)).

Carpopogon capitatum Roxb., *Fl. Ind.* 3: 284 (1832). Type: Roxburgh drawing no. 285 (lectotype K!; Wilmot-Dear loc. cit. (1984)).

Mucuna capitata Wight & Arn., *Prodr.* 1(2): 255 (1834); *Bak. in Hook. f., Fl. Brit. Ind.* 2: 187 (1876); Duthie, *Fl. Upper Gang. Plain* 1: 237 (1903). Gupta, *For. Fl. Chakrata etc. U.P. (Rev. ed. of Kanjilal, For. Fl. Siwalik etc.)*: 177 (1928). Type as for *Carpopogon capitatum* (lectotype K!; Wilmot-Dear loc. cit. (1984)).

M. nivea (Roxb.) Wight & Arn.; *Prodr.* 1(2): 255 (1834); *Bak. in Hook. f.; Fl. Brit. Ind.* 2: 188 (1876); Prain, *Bengal Pl.*: 400 (1903).

M. utilis Wall. ex Wight, *Ic. Pl. Ind. Or.* 1: 280 (1840).

M. pruriens (L.) DC. var. *capitata* (Wight & Arn.) *Burck* in *Ann. Jard. Buitenzorg* 11: 187 (1893); Haines, *For. Fl. Chota Nagpur*: 325 (1910) & [as *M. prurita* var. *capitata*] *Bot. Bihar Orissa* 3: 284 (1922).

M. pruriens (L.) DC. var. *nivea* (Roxb.) Haines, loc. cit. (1910) & [as *M. prurita* var. *nivea*] (1922).

M. pruriens (L.) DC. f. *cochinchinensis* (Lour.) *Back.*, *Fl. Java* 1: 629 (1963); Babu, *Herb. Fl. Dehra Dun*: 154 (1977).

M. pruriens (L.) DC. f. *utilis* (Wall. ex Wight) *Back.*, loc. cit. (1963); Babu, loc. cit. (1977).

M. nigra Buch.-Ham. ex Wall. *Num. List* 5617; *nom nud.*

Stem pubescent as in var. *pruriens* but always without longer coarser hairs. *Leaflet* texture and indumentum as in var. *pruriens*; terminal leaflet often markedly smaller than laterals, 6.5–15 × 4.5–10 cm, length rarely over 1½ × width; lateral leaflets up to 20 cm long. *Inflorescence* axis and pedicels pubescent as in var. *pruriens* but without deciduous red-brown bristles, although long finer hairs often present on calyx. *Calyx* with lowest tooth up to twice, never 3 ×, as long as lateral lobes. *Corolla* purple or white, often rather short; standard 1.6–1.8 cm long, wings 2–3.5 cm, keel 2.8–3.5(–4.5) cm. Fruits linear but often misshapen due to irregular size of swellings around seeds, sometimes up to 2 cm broad in places; surface with dense or sparse short adpressed or erect fine soft light brown hairs and irregular ± longitudinal wrinkles especially near margin, usually clearly visible beneath indumentum. *Seeds* whitish, fawn, pale orange or black, sometimes marbled in these colours or with oblique dark markings; aril orange.

SIKKIM. Terai, 1852, *Hooker* s.n. (K).

INDIA. W Bengal: Dharampur, Dec. 1916, *Haines* 4634 (K); Darjeeling (cult. Missouri), *S.P.I.* no. 32488 (K). Harayana: Karnal Dist., 1886 & 1887, *Drummond* 25343 & 25344 (K). Bihar: Ara, 1801, *Buchanan-Hamilton* s.n. (E); Singbhum, 20 Oct. 1902, *Haines* 544 (K).

Unlocalised: W Himalayas, 1852, *Edgeworth* 2047 (K); Banda, garden, *Edgeworth* 2047 (FHO). E Himalayas: Gunjoruja: 1800, *Buchanan & Hamilton* s.n. (E) & *Wallich* 5617 (BM, K). Botanic garden, 5 Dec. 1814, *Wallich* 5624 (K). Kerala/Tamil Nadu, *Wight* 754 (E).

SRI LANKA. Botanic Garden (Cult.), *Maxwell* 1028 (PDA); Ruhuna, Hambantota Dist., *Wirawan* 795 (K, PDA); Ratnapura Dist., garden, 28 June 1972, *Hepper & Fernando* 970 (K).

EXTERNAL DISTRIBUTION. Cultivated widely in tropics.

HABITAT. Cultivated in gardens; also naturalised in forest and scrub.

This variety is not absolutely distinguishable from var. *pruriens* without fruit. It is a cultivated form grown widely as a fodder crop and for green manure.

M. minima Haines, of which type material has not been located, almost certainly belongs to this species; from the description it is possibly a small-leaved form of var. *utilis* but no fruit being described it is impossible to be certain.

M. pruriens sens. lat. (non-fruiting specimens referable either to var. *pruriens* or to var. *utilis*):

NEPAL. Butwal 7 Oct. 1964, *Stainton et. al.* (BM).

BANGLADESH. Sylhet, *Wallich* 5623C *pro parte* [mixture with *M. imbricata*] (BM, K).

BURMA. Irrawaddi, *Wallich* 5616B (BM, K); Fort Stedman, Nov. 1892, *Huk* s.n. (BM).

INDIA. Himachal Pradesh: Pathankot, 1936, *Stewart* 10367 (Islamabad). Uttar Pradesh: Saharanpur, *Duthie* 11044 (86) (E). Maharashtra: Yeotmal Dist., 1978, *Karthi Keyan* 1566 (BSI); Chandrepur Dist., 1972, *Wadhwa* 130451 (BSI). Goa: Nagar-Haveli, 1970, *Ansari*, BSI 127057 (BSI). Karnataka: Poona, Castle Rock, Nov. 1890, *Bhiva* s.n. (E). Andhra Pradesh: 'Madras, N. Div.', 1852, *Elliot* in Herb. *Cleghorn* s.n. (E); Warangal Dist., 1960, *Sebastine* 11635 (CAL, MH). Kerala: Vettlipara, *Fernandes* 10 (K). Tamil Nadu: Chingleput Dist., 1976, *Henry* 47022 (MH); Pondicherry, *Perrotet* 207 (K).

SRI LANKA. *Thwaites*, C.P. 3150 (BM).

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