

Flora of Singapore precursors, 32: Discoveries in *Mucuna* (Leguminosae, subfamily Papilionoideae) with a review of the genus in Singapore

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ABSTRACT. The discovery of *Mucuna biplicata* Teijsm. & Binn. ex Kurz in Singapore is an addition to the native flora. *Mucuna pruriens* (L.) DC. var. *pruriens* is reported as a non-native new record for Singapore. *Mucuna gigantea* (Willd.) DC. subsp. *gigantea* is rediscovered. With a total of four species, an identification key to the taxa of *Mucuna* in Singapore is provided. Descriptions are provided for all taxa based on the Singapore specimens. A lectotype is designated for *Mucuna lucidula* Burck.

Keywords. Conservation assessments, lectotypification, legumes, new records, Phaseoleae, rediscovery, taxonomy

Introduction

Mucuna Adans. consists of slightly over 100 tropical and subtropical species of which more than half occur in Asia (Lackey, 1981; Schrire, 2005). Almost all species in the genus are lianas with very few exceptions and many species are notorious for the presence of irritant hairs, especially on the surface of the pods (Wiriadinata et al., 2016). In a recent taxonomic review of *Mucuna* in Malesia (Wiriadinata et al., 2016), 48 species are recognised in the region. Only two native species were known to occur in Singapore (Wilmot-Dear, 1992; Wiriadinata et al., 2016) and both have been regarded as locally extinct in Singapore (Chong et al., 2009; Wiriadinata et al., 2016).

In recent years, more frequent floristic surveys in different parts of Singapore have led to interesting discoveries for the genus. These surveys were in areas that were previously villages or for other human uses but had been abandoned and had reverted to forest vegetation over several decades. *Mucuna biplicata* Teijsm. & Binn. ex Kurz is reported here as being a new record for Singapore of a native species. *Mucuna gigantea* (Willd.) DC., previously reported as nationally extinct in Singapore (Chong et al., 2009), is reported as rediscovered, and the non-native *Mucuna pruriens* (L.) DC. has been found as naturalised in several localities in the country.

Materials and methods

An identification key to the taxa of *Mucuna* occurring in Singapore is given; those only known in cultivation are excluded. Vegetative character states are generally not used as diagnostic characters in the identification key, except for *Mucuna pruriens*, because there are only very few specimens of each of the other species in Singapore and vegetative differences may merely represent local variation that might not apply to the species over its entire distribution range.

Descriptions given under each taxon treatment are based only on specimens collected in Singapore. The taxonomy follows Wilmot-Dear (1992) with updates from Wiriadinata et al. (2016). Herbarium acronyms follow Thiers (continuously updated). For each native taxon treatment, the provisional IUCN conservation assessment for Singapore is assessed under the criteria set out in Davison (2008).

Key to species of *Mucuna* in Singapore

- 1a. Abaxial half of lateral leaflets deltoid with a truncate to cordate base, more than twice as broad as the adaxial half; lateral veins running right into margin; pod oblong-linear, to 1.5 cm across, somewhat sigmoid, sutures without wings, surface longitudinally ribbed 4.1 *M. pruriens* var. *pruriens*
- 1b. Abaxial half of lateral leaflets ovate with a rounded to broadly rounded base, up to twice as broad as the adaxial half; lateral veins never running into margin; pod oblong [not seen in Singapore for *M. acuminata*], at least 2.5 cm across with wings along sutures, surface smooth or with oblique cross ridges (lamellae) 2
- 2a. Leaflet apex constricted abruptly, acumen often c. 10 mm or longer, rarely shorter; inflorescence elongate (not pseudo-umbellate); pod lamellae obliquely transverse, apically bifurcated 2. *M. biplicata*
- 2b. Leaflet apex mucronate or gently constricted, acumen 2–6 mm long; inflorescence pseudo-umbellate; pod [not seen in Singapore for *M. acuminata*] without lamellae 3
- 3a. Inflorescence axis up to 7.5 cm but often below 3 cm long; calyx lobes well-developed especially the lower one, 4–6 mm long; standard about half of keel length 1. *M. acuminata*
- 3b. Inflorescence axis usually more than 8 cm long, occasionally less; calyx lobes shallow, 2–3 mm long; standard about two-thirds of keel length 3.1 *M. gigantea* subsp. *gigantea*

Taxonomy

1. *Mucuna acuminata* Graham ex Baker in Hooker, Fl. Brit. India 2: 185 (1876); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(1): 67 (1897); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 408 (1897); Ridley, Fl. Malay Penins. 1: 577 (1922); Wilmot-Dear, Kew Bull. 47: 214, fig. 3 (1992); Turner & Tan in Wee & Ng (ed.), First Look Biodivers. Singapore 118 (1994); Ng & Wee (ed.), Singapore Red Data Book 291 (1994); Turner, Gard. Bull. Singapore 47: 306 (1997 [‘1995’]); Tan et al. in Davison et al. (ed.), Singapore Red Data Book, ed. 2, 223 (2008); Chong et al., Checkl. Vasc. Pl. Fl. Singapore 62, 135, 195 (2009); Wiriadinata et al., Blumea 61: 103 (2016). – TYPE: [Malaysia], Penang, 1822, *Wallich s.n.* [EIC 5621] (lectotype K-W [K001121480], designated by Wilmot-Dear (1992: 214, as ‘holotype’); isolectotypes BM [BM000946933], K [K000894908]).

Mucuna lucidula Burck, Ann. Jard. Bot. Buitenzorg 11: 190 (1893). – TYPE: [Indonesia], Sumatra, Padang, Ajer Mantjoer [Air Mancur = Anai Valley Waterfall], 360 m, August 1878, *Beccari 621* (lectotype L [L0019124], designated here; isolectotype K [K000894896]).

Mucuna biplicata auct. non Teijsm. & Binn. ex Kurz: Ridley, J. Straits Branch Roy. Asiat. Soc. 33: 71 (1900).

Woody vines (habit not recorded in Singapore). **Stems** finely pubescent, hairs appressed and forward pointing. **Leaves** alternate; stipules caducous; petiole 7.5–10 cm long; sparsely pubescent and more densely so at the pulvinus; lamina pinnately trifoliolate; rachis 2.5–2.8 cm long; stipels c. 3 mm long, acicular, appressed; petiolule with sparse pale-brown bristles extending to the base of main vein; terminal leaflet broadly ovate, (6–)7–8 × (4.5–)6–6.5 cm, base rounded to broadly rounded, acumen mucronate, 3–4 mm long; lateral leaflets asymmetrical, (5.5–)7–8 × (4–)5–6.5 cm, abaxial half 1.5–1.7 times broader than the adaxial half, base broadly rounded abaxially and rounded adaxially, acumen same as terminal ones; lateral veins 5–6 pairs, only very slightly curved (except near margin) and ending before reaching margin; glabrous above, very sparsely hairy below and more so along the veins. **Inflorescences** axillary (on leafy branches?), pendulous, 2–3 cm long (on the specimen appears to be still developing), with 2–3 short branches of c. 4 mm long, branches somewhat crowded near the tip forming a weak pseudo-umbel; peduncle and rachis clothed in thick strigose hairs; flowers fascicled, 1–3 per brachyblast; pedicels 12–18 mm long, with similar strigose hairs; bracts and bracteoles not seen; calyx campanulate, cup c. 7 mm tall and c. 12 mm across, strigose with longer reddish-brown irritant bristles; calyx lobes 4, lower tooth c. 6 mm long, laterals c. 4 mm long, triangular, upper c. 5 mm long, broadly triangular with round or bifid apex; corolla colour unknown in Singapore (but described as pale green, fawn and white and purple elsewhere); standard c. 2.6 × 2.3 cm, broadly obovate, basal claw c. 4 mm long with a pair of c. 1.5 mm long auricles; wings c. 4.5 × 1.3 cm including claw c. 7 mm long, basal dorsal auricle c. 3 mm long, outer surface

and margins hairy basally; keel of two partly connate petals, c. 4.5×0.6 cm including claw c. 8 mm long, basal, dorsal auricle c. 2 mm long, sparsely hairy towards the outer face. **Stamens** 10, diadelphous, staminal tube c. 3.5 cm long. **Pod** not seen in Singapore [for pod description from elsewhere, see Wilmot-Dear (1992), Wiriadinata et al. (2016) and Leeratiwong et al. (2018)].

Distribution. Southern Thailand (Leeratiwong et al., 2018), Peninsular Malaysia, Singapore, Sumatra, Java and Lesser Sunda Islands (Bali, Flores).

Ecology. Across its distribution, reported to occur in open places such as woods and thickets at low elevations and especially by rivers.

Etymology. Latin, *acuminatus* = with a long, narrow, pointed tip; application uncertain but may refer to the abruptly acuminate leaflets.

Provisional IUCN conservation assessment for Singapore. Nationally Extinct (Lindsay et al., 2022). Collected only very infrequently in Singapore in the late nineteenth century.

Specimens examined. SINGAPORE: without locality, *unknown collector* [Ridley?] 2740 (SING [SING0011355]). **Nee Soon:** Chan Chu Kang, 22 Nov 1890, *Goodenough 2075* (SING [SING0201728]); *ibidem*, 1890, *Ridley 2075* (BM).

Notes. In the absence of pods, *Mucuna acuminata* closely resembles *M. biplicata* and was initially misidentified as such by Ridley (1900). *Mucuna acuminata* often has shorter inflorescences (to 10 cm according to Leeratiwong et al., 2018), better-developed calyx lobes and \pm smooth pods. The corolla of *Mucuna acuminata* has mostly been described as light/pale green to ‘fawn and white’ (Prain, 1897; Ridley, 1922; Wiriadinata et al., 2016); only Wiriadinata et al. (2016) included purple as a distinct colour variation.

The specimens *Goodenough 2075* and *Ridley 2075* are possibly duplicates of each other; J.S. Goodenough is known to have collected for H.N. Ridley. The specimen *unknown collector 2740* is most likely a collection from Ridley from the late 1800s and bears his handwriting on the label. The specimen has an inflorescence of c. 7.5 cm long and two loose leaflets: a terminal and a lateral. Although the inflorescence is longer than the usual 3–4 cm, it still falls within the range of the species (see Wilmot-Dear, 1992; Wiriadinata et al., 2016; Leeratiwong et al., 2018). However, the two loose leaflets do not bear any resemblance to those from the other *Mucuna* specimens from Singapore or the type material of *Mucuna acuminata*.

When Burek (1893) described *Mucuna lucidula*, he did not indicate the place where the type is deposited. Previous work that treated this name (Wilmot-Dear, 1992; Wiriadinata et al., 2016) may have assumed that the holotype is in BO. No such specimen has been located in BO (Ida Haerida, pers. comm. 4 Jan 2021). Thus, a lectotype is selected here following the suggestion by McNeill (2014) for such a situation.

The specimen listed by Wilmot-Dear (1992) as a ‘holotype’ of *Mucuna acuminata*, is corrected to lectotype in conformity with ICN Art. 9.10 (Turland et al., 2018) and as advocated by McNeill (2014).

2. *Mucuna biplicata* Teijsm. & Binn. ex Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 43: 186 (1874); Burck, Ann. Jard. Bot. Buitenzorg 11: 186, pl. 14: 1 (1893); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 407 (1897); Ridley, Fl. Malay Penins. 1: 576 (1922); Wilmot-Dear, Kew Bull. 47: 228, fig. 8 (1992); Wiriadinata et al., Blumea 61: 105 (2016). – TYPE: Indonesia, cult. in Hort. Bot. Bogor (originally from Borneo, West Kalimantan, Kapuas), *Teijsmann 8183* (lectotype BO [sheet no. BO-1249908], designated by Wilmot-Dear (1992: 228, as ‘holotype’). (Fig. 1–3)

Woody vines. **Stems** glabrous. **Leaves** alternate; stipules early caducous, lanceolate, c. 1.5 mm long, hairy; petiole 6–11 cm long, glabrous to sparsely pubescent at the pulvinus; lamina pinnately trifoliolate; rachis 1.5–2.5 cm; stipels c. 2 mm long, acicular, appressed; petiolule with sparse orange-brown bristles; terminal leaflet broadly elliptic, 7.5–10 × 6–7 cm, constricted abruptly near the tip, base rounded, acumen (6–)10–14 mm long, c. 1.5 mm wide and slightly broadened above before ending in a short sharp point; lateral leaflets asymmetrical, 8–10 × 5.5–6.5 cm, abaxial half 1.5–2 times broader than the adaxial half, base of both halves rounded, acumen same as terminal ones; lateral veins 4–5 pairs, only very slightly curved (except near margin) and ending before reaching margin; glabrous above, very sparsely hairy below but more so along the veins. **Inflorescences** axillary on leafless branches, pendulous, 4.5–7 cm long, with 5–6 short branches of c. 5 mm long; peduncle and rachis with spreading fine pubescence, thickened in fruit; flowers fascicled, 1–3 per brachyblast; pedicels 4–5 mm (in bud), with spreading fine pubescence; bracts and bracteole very early caducous (not seen, only scars observed); calyx campanulate, cup c. 10 mm long and c. 4 mm across in bud, with spreading pale fine pubescence and longer reddish-brown irritant bristles; calyx lobes 4, lower tooth c. 5 mm long, laterals c. 3 mm long, triangular; upper c. 2.5 mm long, rounded-obtuse; corolla dark purple; standard c. 2.5 × 2.2 cm, orbicular, basal claw c. 2 mm long; wings c. 5 × 1.6 cm including claw c. 6 mm long, basal dorsal auricle c. 4 mm long, outer surface and margins hairy basally; keel of two partly connate petals, c. 4.8 × 0.7 cm including claw c. 7 mm long, basal dorsal auricle c. 2 mm long, glabrous; stamens 10, diadelphous, staminal tube c. 3.4 cm long, staminodes present; pistil incomplete in Singapore material, ovary c. 8 mm long, c. 2 mm across, hairy. **Pod** leathery, oblong with rounded apex and base, 5–7.5 cm long, 3–3.5 cm wide and c. 1.5 cm thick, flattened and not swollen around seeds, suture winged 1–2 mm away on both sides, wings 3–5 mm wide; apex rounded; lamellae present on pod surface, obliquely transverse c. 2 mm high, often interrupted along mid-line of pod, apically bifurcated into 2 wings (T-shaped in cross-section), wings 1.5–2 mm wide on each side; margin of pod with a pair of wings c. 2 mm away from the suture, slightly revolute, 3–5 mm width and appearing raggedly dentate at points where lamellae appear; surface of pods including lamellae and wings ornamented with



Fig. 1. *Mucuna biplicata* Teijsm. & Binn. ex Kurz. **A.** Habit. **B.** Pods on twining stems in the canopy. All from *Lua SING2017-005*. (Photos: A, H.K. Lua; B, L.M.J. Chen)



Fig. 2. *Mucuna biplicata* Teijsm. & Binn. ex Kurz. **A.** Trifoliolate leaf with long leaflet tips. **B.** Mature pod from side view showing the typical surface lamellae. **C.** Mature pod from dorsal view showing wings along suture. All from *Lua SING2017-005*. (Photos: H.K. Lua)

sparse short golden-brown hairs and abundant reddish-brown irritant bristles, bristles c. 2.5 mm long, erect. **Seeds** 1–3 per pod, chocolate brown, 14–18 × 13–15 × 8–9 mm, hilum extending c. 3/4 of circumference.

Distribution. Sumatra, Peninsular Malaysia, Singapore (new record) and Borneo.

Ecology. In Singapore, found along the banks of a canal that was formerly a natural river. Judging from its affinity with streams and riverbanks, the species is likely to be dispersed by running water.

Etymology. Latin, *bi-* = two, *plicatus* = folded lengthwise; referring to the bifurcating pod lamellae.



Fig. 3. *Mucuna biplicata* Teijsm. & Binn. ex Kurz. **A.** Flower from side view. **B.** Flower from dorsal view. **C.** Maturing pod with abundant reddish-brown irritant bristles. **D.** Seeds, chocolate brown, each with a long hilum. A, B, D from Lua *et al.* SING2022-251; C from Lua SING2017-005. (Photos: A, B, D, B.C. Ho; C, L.M.J. Chen)

Provisional IUCN conservation assessment for Singapore. Critically Endangered (CR/D). Known only from a single locality. Although the vegetation of this locality was cleared in the late 90s and early 2000s, we speculate that there may have been a former population in the vicinity and the current mature plant grew from seeds that sprouted after the land was cleared. We consider it native to Singapore. Seedlings have been observed around the mature plant [SING2022-251]. Seeds have been collected and germinated at the Pasir Panjang Nursery for propagation and reintroduction into suitable habitats. Similarly, cuttings have been made.

Specimens examined. SINGAPORE: **Tengah:** Tengah Forest, 11 Jan 2017, *Lua* SING2017-005 (E [E00871742], SING [SING0228001, SING0228002]); *ibidem*, 14 Feb 2022, *Lua et al.* SING2022-251 (SING [SING0359403, SING0359404]).

Notes. The species is easily recognised by oblique lamellae on the pod surface which are bifurcating and interrupted in the middle. In the absence of fruit, see notes under *Mucuna acuminata* for other differences. Only one dropped flower of *Mucuna biplicata* has been collected and examined in this study but it had been partly eaten by an unknown herbivore. Among *Mucuna* specimens collected in Singapore, the leaflets of *M. biplicata* stand out by having an abruptly constricted tip and a long narrow acumen of c. 1 cm long. However, the long acumen is probably a local variation of the species (see illustration in Wilmot-Dear, 1992). Moreover, the type specimens of *Mucuna acuminata* have similar long leaflet acumens although the Singapore specimens of this same species have a mucronate tip.

The specimen listed by Wilmot-Dear (1992) as ‘holotype’ of *Mucuna biplicata* is corrected to lectotype in conformity with ICN Art. 9.10 (Turland et al., 2018) and as advocated by McNeill (2014).

3. *Mucuna gigantea* (Willd.) DC., Prodr. 2: 405 (1825); Burck, Ann. Jard. Bot. Buitenzorg 11: 187 (1893); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 408 (1897); Ridley, J. Straits Branch Roy. Asiat. Soc. 33: 71 (1900); Ridley, Fl. Malay Penins. 1: 577 (1922); Wilmot-Dear, Kew Bull. 39: 56 (1984); Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. 37 (1990); Turner et al., J. Singapore Natl Acad. Sci. 18 & 19: 73 (1990); Wilmot-Dear, Kew Bull. 45: 5, fig. 1 (1990); Wilmot-Dear, Kew Bull. 47: 213 (1992); Turner, Gard. Bull. Singapore 45: 122 (1993); Turner & Tan in Wee & Ng (ed.), First Look Biodivers. Singapore 118 (1994); Ng & Wee (ed.), Singapore Red Data Book 291 (1994); Turner, Gard. Bull. Singapore 47: 306 (1997 [‘1995’]); Tan et al. in Davison et al. (ed.), Singapore Red Data Book, ed. 2, 223 (2008); Chong et al., Checkl. Vasc. Pl. Fl. Singapore 62, 135, 195 (2009); Wiriadinata et al., Blumea 61: 108 (2016). – *Dolichos giganteus* Willd., Sp. Pl., ed. 4, 3(2): 1041 (1802). – TYPE: [Published illustration] ‘*Kaku-Valli*’ in Rheede, Hort. Malab. 8: t. 36 (1688), lectotype designated by Wilmot-Dear (1984: 56).

Notes. Wilmot-Dear (1984) effectively lectotypified *Mucuna gigantea* with a plate in Rheede's *Hortus Malabaricus*.

Two subspecies are currently recognised (Wiriadinata et al., 2016). The type subspecies is widely distributed and morphologically rather variable whereas *Mucuna gigantea* subsp. *tashiroi* (Hayata) H. Ohashi & Tateishi is less variable and endemic to Taiwan. *Mucuna gigantea* subsp. *gigantea* is the taxon in Singapore.

3.1. *Mucuna gigantea* (Willd.) DC. subsp. *gigantea* (Fig. 4, 5)

Woody sprawling vines. **Stems** glabrous to sparsely hairy on the younger parts. **Leaves** alternate; stipules triangular-lanceolate, 3–4 × c. 1 mm, caducous, hairy; petiole 2.8–13 cm long; lamina pinnately trifoliolate; rachis 1.2–2.8 cm; stipels 2.5–3 mm long, acicular, appressed; petiolule with sparse pale hairs similar to those on petiole; terminal leaflet 5.4–11.7 × 3–7.4 cm, ovate-elliptic; gently constricted to a short acute tip, base obtuse-rounded, acumen bluntly acute, 2–6 mm long, 2.5–4 mm wide; lateral leaflets asymmetrical, 5.8–10.8 × 3.6–7.2 cm, abaxial half c. 2 times broader than the adaxial half, base broadly rounded abaxially and cuneate adaxially, acumen same as terminal ones; lateral veins 3–4(–5) pairs, only very slightly curved (except near margin) and ending before reaching margin; glabrous above, very sparsely hairy below and more so along the veins. **Inflorescences** axillary on green leafy branches, pendulous, 10–17 cm long, with 3–4 short branches of c. 8 mm long, branches crowded along c. 1.5 cm rachis forming a pseudo-umbel, peduncle and rachis sparsely short hairy, more densely so towards the ends; flowers fascicled, 1–3 per brachyblast; pedicel up to c. 12 mm long, densely silky hairy; bracts not seen; bracteoles (detached) oblong cucullate, 11.5–12 × 5–5.5 mm, densely short hairy on the outer face; calyx campanulate, cup c. 10 mm long and c. 12 mm across (5 mm across in bud), short hairy with longer yellowish brown irritant bristles especially nearer to the base; calyx lobes 4, lower and laterals broadly triangular to obtuse, 2–3 mm long, upper shallowly bilobed; corolla pale yellowish green; standard c. 2.3 × 2.3 cm, orbicular, basal claw c. 3 mm long; wings c. 3.5 × 1.1 cm including claw c. 7 mm long, basal dorsal auricle c. 2.5 mm long, outer surface and margins hairy basally; keel of two partly connate petals, c. 3.5 × 0.7 cm including claw c. 8 mm long, basal, dorsal auricle c. 1.5 mm long, sparsely hairy along the lower edges; stamens 10, diadelphous, staminal tube c. 2.2 cm long, staminodes present; pistil c. 3.5 cm long, ovary c. 7 mm long, c. 2 mm across, hairy. **Pod** with stipe c. 6 mm long, leathery, oblong, straight to slightly curved, 6–11 cm long, 3.8–4 cm wide and c. 1.1 cm thick, laterally flattened and slightly swollen around seeds, suture winged c. 3 mm away on both sides, wings 4–8 mm wide; apex obtuse; surface of pods with obscure raised vein-lines without lamellae, ornamented with short appressed pubescence and longer golden-brown irritant bristles, bristles 1–1.5 mm long, appressed, forward pointing. **Seeds** 2–4 per pod, light-brown, 1.9–2 × 2.2–2.3 × c. 1.3 mm, hilum extending c. 3/4 of circumference.



Fig. 4. *Mucuna gigantea* (Willd.) DC. subsp. *gigantea*. **A.** Branch with immature inflorescences. **B.** Mature pod opened to show seeds within. A from Lua & Ang SING2018-061; B from Lua et al. SING2020-1438. (Photos: H.K. Lua)

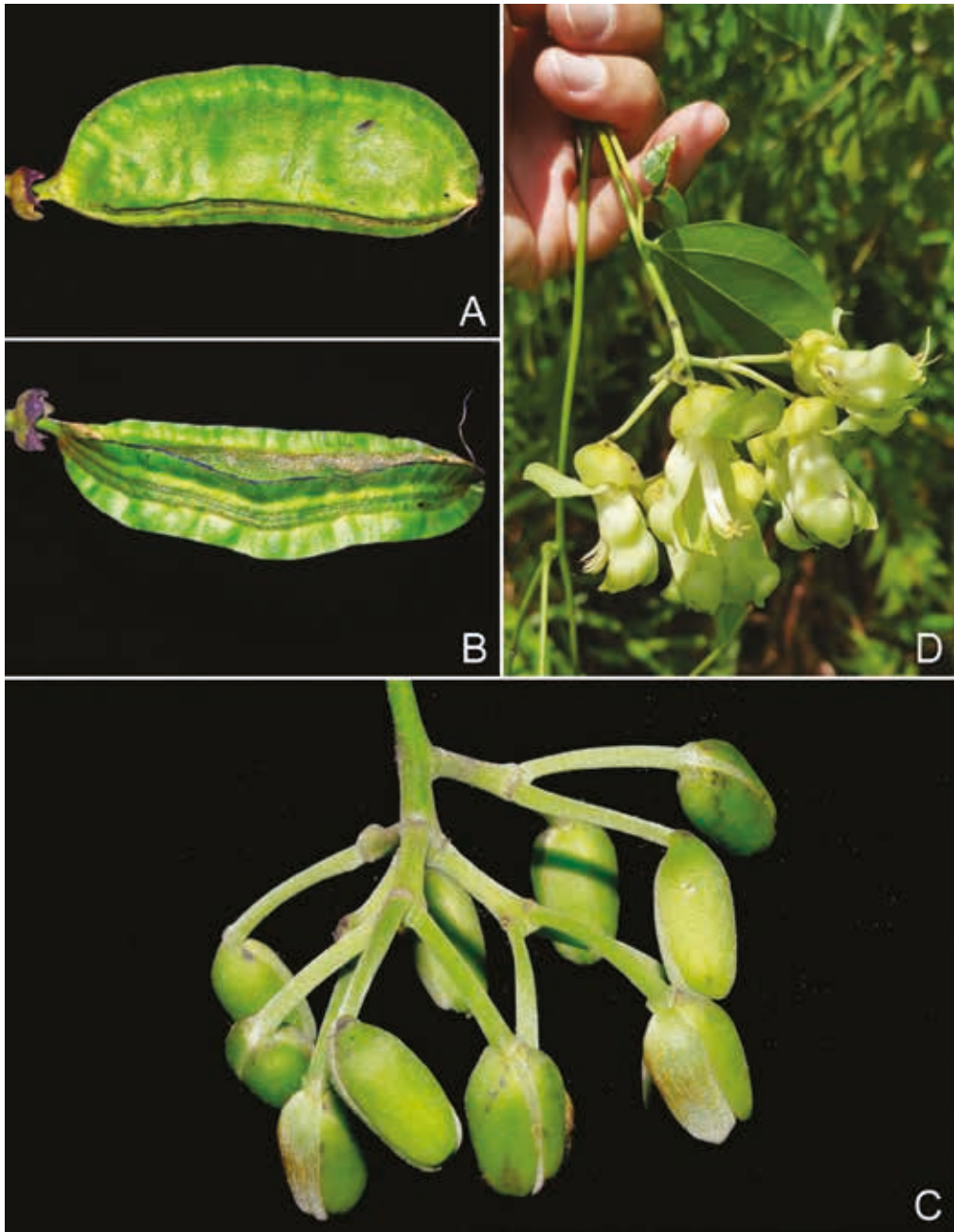


Fig. 5. *Mucuna gigantea* (Willd.) DC. subsp. *gigantea*. **A.** Maturing pod from side view. **B.** Maturing pod from dorsal view showing wings along suture. **C.** Inflorescence with pseudo-umbel arrangement of flower buds. **D.** Inflorescence with opened flowers. A–C from Lua & Ang SING2018-061; D from Lua et al. SING2020-1438. (Photos: A–C, L.M.J. Chen; D, H.K. Lua)

Distribution. West Africa, islands in the Indian Ocean, Indian subcontinent, southern China, southern Japan, throughout Southeast Asia, Australia and the Pacific islands.

Ecology. In Singapore found only in coastal vegetation or sea walls. Coastal distribution in the Indian Ocean and Western Pacific Ocean. Known to be dispersed by sea currents.

Etymology. Greek, *gigantos* = huge; application uncertain.

Provisional IUCN conservation assessment for Singapore. Critically Endangered (assessed here). The species was first reported for Singapore from a specimen collected from Pulau Blakang Mati (= Sentosa) in the late nineteenth century. It was then recollected in 1958 along the eastern coastline of mainland Singapore but the area was affected by land reclamation works in the 1970s. The species was regarded as extinct (Chong et al., 2009) until it was recently rediscovered near the coast of Pulau Brani, a small island with restricted access, situated between the mainland and Sentosa. The only known existing population is small, comprising two clumps on a hill overlooking the historical coastline. Inflorescences and fruit pods were observed and a collection was made from the larger clump near the hill summit closer to the old coastline, which may have persisted and grown up the hill slope when the shore was later developed into a port facility in the 1990s. The smaller clump, a distance down the hill beside an abandoned building, may have developed from seeds dispersed down the slope from the larger clump. This clump has not yet been seen in a fertile state. Seeds were collected and have been germinated at the Pasir Panjang Nursery for propagation and reintroduction into suitable habitats.

Specimens examined. SINGAPORE: **Changi:** between Tanah Merah Besar and Telok Paku, 30 Nov 1958, *Sinclair 9972* (SING [SING0011357, SING0011358]), US [02340500]. **Southern Islands:** Blakang Mati [Sentosa], 1898, *Ridley s.n.* (SING [SING0011356]); Pulau Brani, 24 Jan 2018, *Lua & Ang SING2018-061* (SING [SING0359401, SING0259402]); *ibidem*, 17 Nov 2020, *Lua et al. SING2020-1438* (SING [SING0318007, SING0318008, SING0318009]).

Notes. The subspecies was specifically cited by Wilmot-Dear (1984, 1992) and Wiriadinata et al. (2016).

4. *Mucuna pruriens* (L.) DC., Prodr. 2: 405 (1825); Baker in Hooker, Fl. Brit. India 2: 187 (1876); Burck, Ann. Jard. Bot. Buitenzorg 11: 187 (1893); Ridley, Fl. Malay Penins. 1: 577 (1922); Wilmot-Dear, Kew Bull. 39: 61 (1984); Wilmot-Dear, Kew Bull. 47: 235 (1992); Wiriadinata et al., Blumea 61: 115 (2016). – *Dolichos pruriens* L., Herb. Amboin. 23 (1754). – TYPE: [Published illustration] Rumphius, Herb. Amboin. 5: t. 142 (1747), lectotype designated by Merrill (1917: 277).

Notes. This is the only species occurring in Singapore that belongs to *Mucuna* subg. *Stizolobium* (P.Browne) Baker. The others belong to *Mucuna* subg. *Mucuna*. The subgenera are traditionally segregated on the basis of fruit and seed morphology (see Wilmot-Dear, 1984, 1992; Wiriadinata et al., 2016).

Two varieties are currently recognised for the Malesian region (Wiriadinata et al., 2016) and all fertile specimens from Singapore belong to the type variety. *Mucuna pruriens* var. *utilis* (Wall. ex Wight) Burck is a cultivated form with complete absence of irritant bristles but has sometimes escaped from cultivation elsewhere (Wilmot-Dear, 1992; Wiriadinata et al., 2016). A flowering specimen without pods collected in Singapore [SING00047599] was identified as *Mucuna pruriens* var. *utilis* by H. Wiriadinata on 18 Jun 1984 but it has some irritant bristles on the 8–9 mm long calyx and thus should also belong to the type variety. Lacking any fertile parts, two sterile specimens in SING (indicated below) cannot be further identified to varietal level but are here assumed to also belong to the type variety.

Although Wilmot-Dear (1984) is the earliest reference we have found which explicitly cited Rumphius' illustration as the type of *Mucuna pruriens*, Merrill (1917) stated that 'The Rumphian figure and description are the whole basis of *Dolichos pruriens* Linn. and the species must accordingly be interpreted from it'. We thus interpret Merrill (1917) as the place of effective lectotypification of the name.

4.1. *Mucuna pruriens* (L.) DC. var. *pruriens* (Fig. 6–8)

Woody vines. **Stems** finely pubescent, hairs appressed and forward pointing. **Leaves** alternate, stipules lanceolate, 3–4 × c. 1 mm, caducous, hairy; petiole 2.5–12; lamina pinnately trifoliolate; rachis 1–3 cm, stipels 4–5 mm long, acicular, appressed; petiolule with pale brown hairs similar to those on petiole; terminal leaflets 6.5–15 × 3.6–9 cm, rhombic-elliptic; base rounded cuneate, acumen acute to rounded with a short sharp mucron up to 2 mm long; lateral leaflets asymmetrical, 7–15 × 4.4–10 cm, abaxial half > 2 to almost 3 times broader than the adaxial half, base truncate to cordate abaxially and rounded-cuneate adaxially, acumen same as terminal ones; lateral veins 5–6(–7) pairs, gently curved throughout and continuing along the margin; short hairy, more densely so below. **Inflorescences** axillary, mostly on leafless branches, pendulous, 15–27 cm long, unbranched, with up to 15 brachyblasts along a 6–9 cm rachis; peduncle and rachis densely white pubescent becoming glabrous, flowers fascicled, 1–3 per brachyblast; pedicel 4–6 mm long, white hairy; calyx campanulate, cup c. 6 mm long and c. 9 mm across, dense white hairy with longer yellowish brown irritant bristles especially nearer to the base; calyx lobes 4, lower and laterals broadly triangular, c. 3 mm long, upper obtuse to rounded, c. 2 mm long; corolla purple; standard c. 2.1 × 1.4 cm, broadly elliptic, basal claw c. 2 mm long; wings c. 3.8 × 1.1 cm including a 5 mm claw, basal dorsal auricle c. 1.5 mm long, basal margins hairy; keel of two partly connate petals, c. 3.7 × 0.5 cm including claw c. 6 mm long, basal dorsal auricle c. 2.5 mm long, sparsely hairy along the lower edges; stamens 10, diadelphous, staminal tube

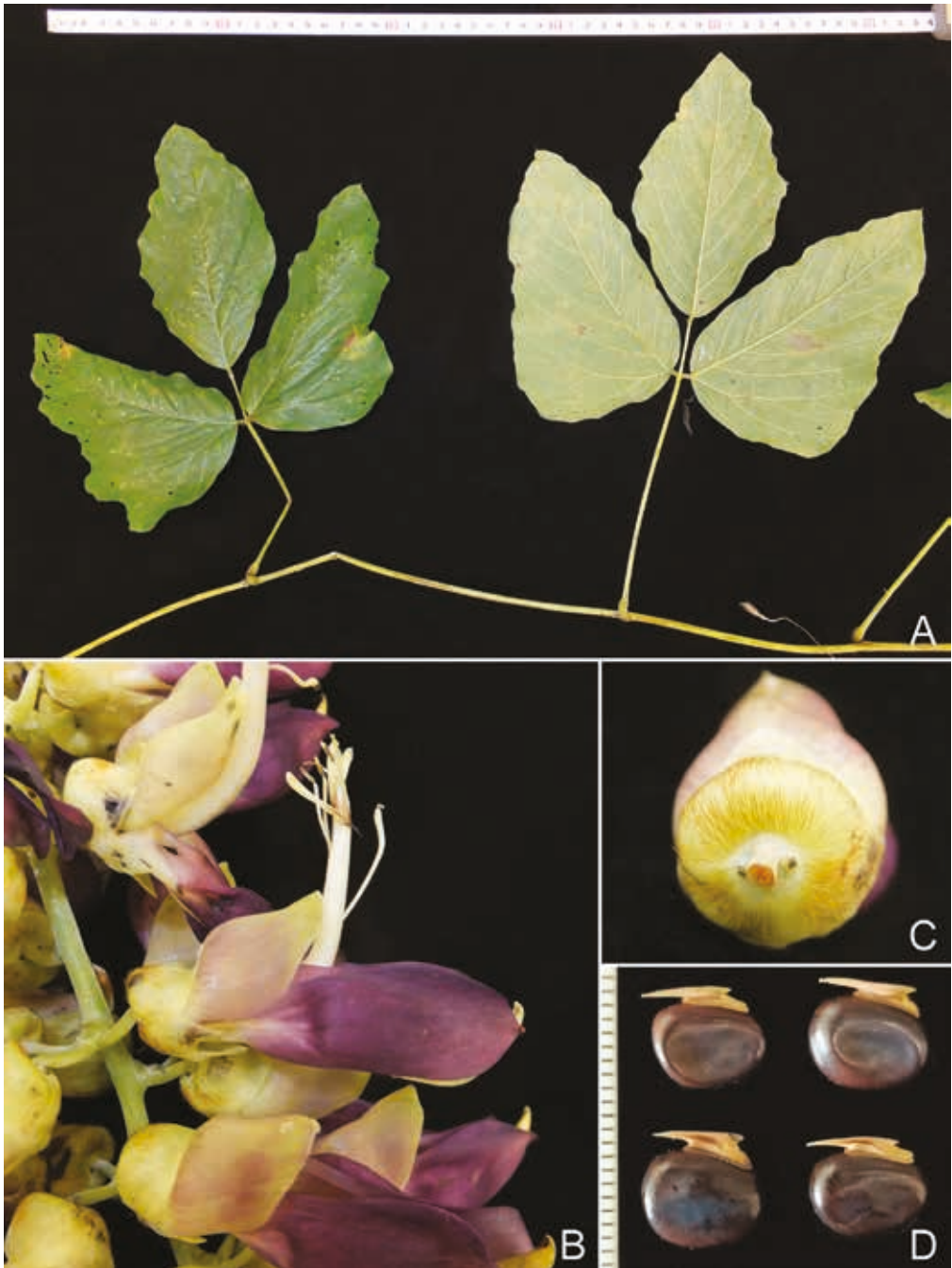


Fig. 6. *Mucuna pruriens* (L.) DC. var. *pruriens*. **A.** Branch with leaves. **B.** Close-up of opened flower. **C.** Bottom view of calyx showing yellowish brown irritant bristles. **D.** Seeds, black and shiny, each with a short hilum. All from *Lua & Ho SING2017-006*. (Photos: B.C. Ho)



Fig. 7. *Mucuna pruriens* (L.) DC. var. *pruriens*. Inflorescence at different stages (from left to right: flower buds, opened flowers, fruits). From *Lua & Ho SING2017-006*. (Photo: B.C. Ho)



Fig. 8. *Mucuna pruriens* (L.) DC. var. *pruriens*. Close-up of sigmoid fruit pods with longitudinal ribs and a hooked apex. Note surface of pod coated with dense yellowish brown irritant bristles. From Lua & Ho SING2017-006. (Photo: B.C. Ho)

c. 3 cm long, staminodes present; pistil c. 3.5 cm long, ovary c. 7 mm long, c. 1.5 mm across, hairy. **Pod** narrowly linear-oblong, often sigmoid, 7–8.5 cm long, 1.2–1.4 cm wide and 0.6–1.8 cm thick, laterally flattened with longitudinal ribs, and not swollen around seeds, suture not winged; apex often hooked; surface of pods ornamented with dense yellowish brown irritant bristles, bristles 1.5–2 mm long, somewhat forward pointing. **Seeds** up to 5 per pod, black, shiny, c. $8 \times 2.2\text{--}2.3 \times 0.3$ mm, hilum c. 5 mm, extending c. 1/4 of circumference, with rim aril.

Distribution. Tropical Africa, Indian subcontinent, subtropical East Asia, continental Southeast Asia and throughout Malesia. New record for Singapore.

Ecology. In Singapore, found in secondary vegetation sometimes smothering shrubs and other treelets.

Etymology. Latin, *pruriens* = itching or stinging; referring to the effect of the irritant bristles.

Specimens examined. SINGAPORE: **Bedok:** Bedok Reservoir Forest, 2011–2012, *Kee & Yee BR3_13* (SING [SING0344971] sterile); *ibidem*, *Kee & Yee BR3_06* (SING [SING0344972] sterile). **Bukit Timah:** Rail Corridor, 300 m south of Bukit Timah Railway Station, 13 Oct 2014, *Lua SING2014-331* (SING [SING0212429, SING0212430]); Dairy Farm Nature Park, 11 Nov 2020, *Yeoh SING2020-1119* (SING [SING03180005, SING03180006]). **Tanglin:** Lermite Road, 12 Jan 1914, *Mhd Nur s.n.* (SING [SING0047598, SING00047599]). **Tengah:** Tengah Forest, 12 Jan 2017, *Lua & Ho SING2017-006* (SING [SING0318001, SING0318002, SING0318003]).

Notes. The variety was specifically cited by Wilmot-Dear (1984, 1992) and Wiriadinata et al. (2016).

Several scattered populations of *Mucuna pruriens* var. *pruriens* have been observed throughout Singapore in open woodland or newly regenerated secondary forest dominated by non-native trees. From the specimen evidence, it is clear they are able to set seed and reproduce in unmanaged vegetation forming self-replacing populations. We consider this to be naturalised in Singapore following the definition given in Chong et al. (2009).

ACKNOWLEDGEMENTS. The specimens were collected under the Permit NP/RP17-098-3 issued by the National Parks Board. Ng Xin Yi from the Native Plant Centre is thanked for providing information on the propagation of *Mucuna biplicata* and *M. gigantea* subsp. *gigantea* at the Pasir Panjang Nursery. Special thanks to Ida Haerida for physically searching for possible type material of *Mucuna lucidula* and providing an image of the type of *M. biplicata* in BO. Lily Chen from the Singapore Botanic Gardens has kindly provided permission to use her photographs.

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