

A new combination for an endemic Hawaiian species of *Mucuna* (Leguminosae: Papilionoideae), with a key to the Hawaiian taxa of the genus

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Summary. Herbarium-based studies of *Mucuna* lead us to make a new combination for a Hawaiian taxon. *Mucuna persericea*, formerly *M. sloanei* var. *persericea*, is an endangered species according to IUCN criteria. It is narrowly endemic to the island of Maui. With its recognition at the species level, we conclude that the genus is represented in Hawaii by three native species, plus several alien species, which are locally cultivated and potentially naturalised. We provide a key to aid in the identification of both the native and cultivated taxa.

Key Words. biodiversity, Fabaceae, Faboideae, flora, Hawaii, Pacific, Phaseoleae, taxonomy.

Introduction

The native vascular plant flora of Hawaii, comprising approximately 1000 species of angiosperms (Wagner *et al.* 1990, 1999), is one of the most thoroughly studied and best documented of tropical oceanic island floras. Of these species, at least 23% are under extinction risk (Wagner *et al.* 1999). Nevertheless, new native Hawaiian plant taxa are still discovered and taxonomic rearrangements for existing taxa are published in the literature on a fairly regular basis (e.g., Wilmot-Dear 1990; Lorence & Wagner 1995; Catalan *et al.* 2009). That the botanical community strive to fill persisting gaps in our knowledge of the native Hawaiian flora is critical given the high degree to which this interesting and unique flora, now approximately equaled in number in Hawaii by naturalised plant species (Wagner *et al.* 1999), is threatened.

As part of a comprehensive systematic study of *Mucuna* Adans. (Leguminosae, subfamily Papilionoideae, tribe Phaseoleae), we reviewed the taxonomy of the genus in Hawaii and studied collections of Hawaiian *Mucuna* housed at A, BM, K, MO, NY and US. Wilmot-Dear (1990) recognised three native Hawaiian taxa of *Mucuna*, comprising

two species and one variety: *M. gigantea* (Willd.) DC. (De Candolle 1825: 405), *M. sloanei* Fawc. & Rendle var. *sloanei* (Fawcett & Rendle 1917: 36) and *M. sloanei* var. *persericea* Wilmot-Dear (1990: 27). While the first two are widespread across the Pacific Islands or around the world, the taxon *M. sloanei* var. *persericea* is known only from the Hawaiian island of Maui. In the protologue, Wilmot-Dear (1990) cited a difference in leaflet indumentum in separating var. *persericea* from the typical variety of *M. sloanei*. We have observed additional differences between these two taxa that warrant recognition of the endemic Hawaiian taxon as a distinct species and make a new combination herein. We also present a dichotomous identification key and geographical distribution maps for the Hawaiian species of *Mucuna*.

Taxonomy

The species of *Mucuna* Adans. are perennial or rarely annual lianas with alternate, 3-foliolate leaves, pendent, pseudoracemose or pseudoumbelliform inflorescences, a campanulate calyx and a showy, resupinate corolla. The pods are covered by urticating hairs.

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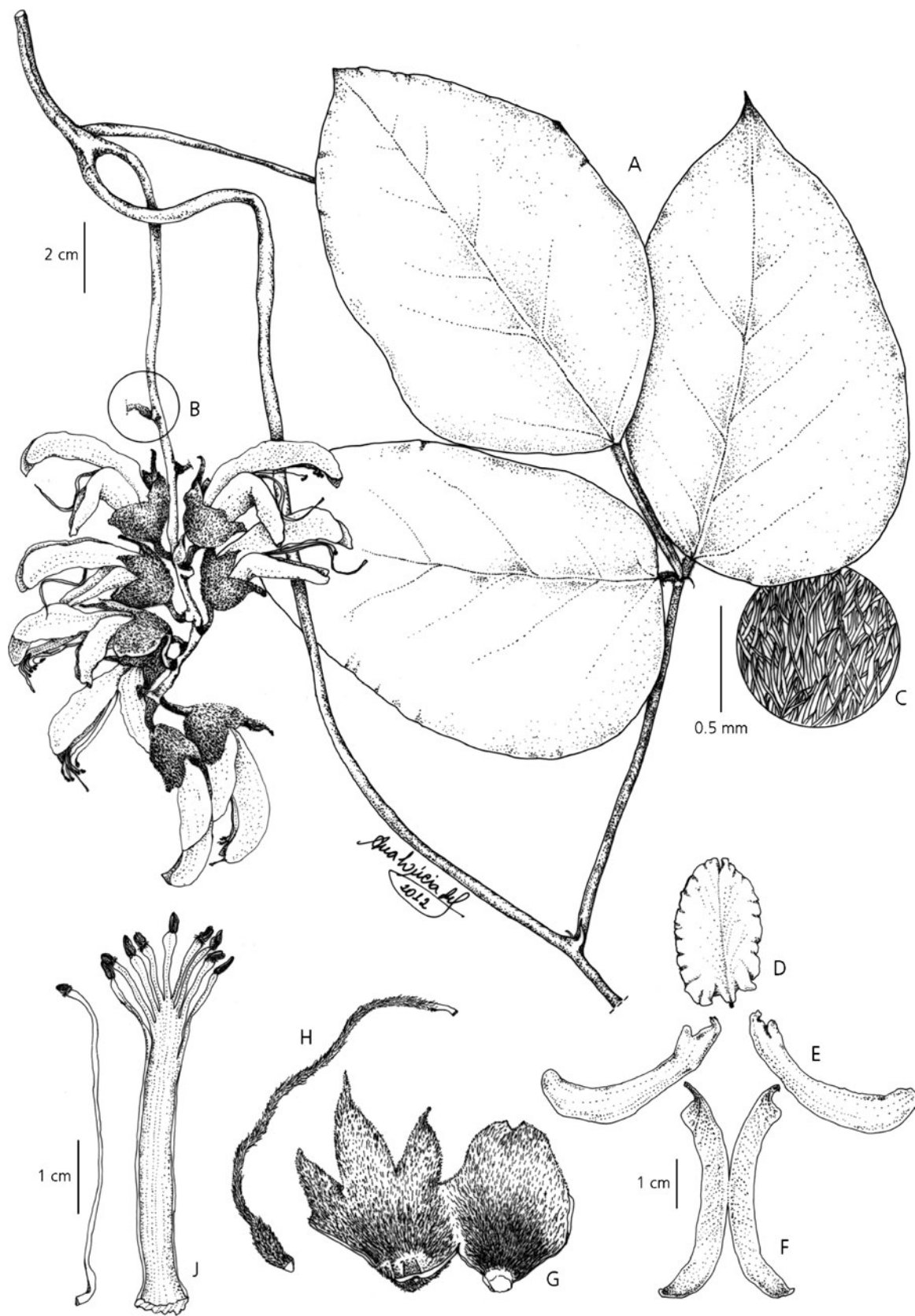


Fig. 1. *Mucuna persericea*. A leaf and inflorescence; B detail of the pedicel of the first flower of the inflorescence; C indumentum on leaflet abaxial surface; D standard petal; E wing petal; F keel petals; G calyx opened out; H gynoecium; J androecium (9 + 1). DRAWN BY ANA LUCIA SOUZA.

Mucuna persericea (Wilmot-Dear) T. M. Moura & A. M. G. Azevedo **comb. nov.** Type: Hawaii, Maui, Keanae¹ Valley, Degener & Wiebke 2286 (holotype K!; isotypes A!, BISH, NY!, US!).

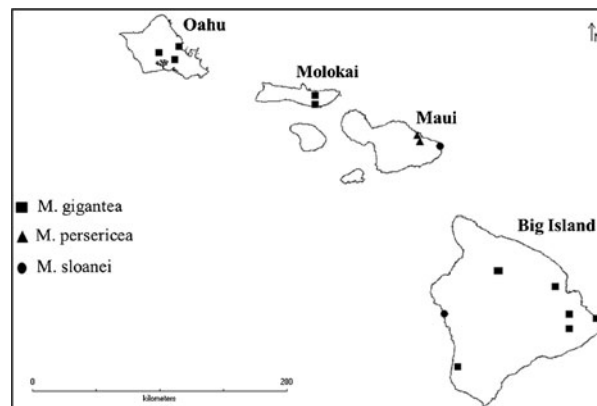
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Basionym: *Mucuna sloanei* var. *persericea* Wilmot-Dear, *Kew Bull.* 45: 27 (1990).

Woody liana, branches sparsely pubescent, with adpressed to erect hairs. Leaves alternate, 3-foliolate; stipules 0.7–1 cm, triangular, silvery-sericeous; petiole 8.5–12 cm, sericeous; rachis 2.5–3.5 cm, sericeous, stipellate between leaflet pairs and at apex; stipels 0.5–0.8 cm, linear; petiolules 0.5–0.7 cm, dense-sericeous; lamina of the apical leaflet 10.5–14 × 5.5–8.5 cm, elliptic, rounded at base, acute at apex, that of the lateral leaflets 12–14.7 × 8–10 cm, basally and medially asymmetric, rounded to weakly cordate at base, acute to weakly acuminate at apex, the abaxial surface of all laminas densely sericeous, with the hairs 0.1–0.2 cm, the adaxial surface more sparsely so, with shorter hairs; venation eucamptodromous, with the secondary veins 4–7-paired. Inflorescence a pseudoraceme, pendent; peduncle 4–8 cm, densely golden-sericeous; rachis 10–13 cm; bracts 1.6–2.1 × 0.5 cm, sericeous; bracteoles c. 3.5 × 2.5 cm, densely sericeous; pedicels paired at nodes, c. 1 cm, sericeous, more densely so than on peduncle; nodes 7–12 per inflorescence; internodes c. 1–2 cm; flowers 4–5 cm long. Calyx campanulate, 2.5–3 cm long, sericeous on both surfaces, the external surface with hairs of two lengths, lobes 4, the 2 adaxial ones connate, 1–2 cm. Petals 5, reportedly yellow; standard 3.5–4 cm long, basally auriculate, apically rounded, the claw 0.1 cm; wing petals 4.5–5 cm long, attenuate at base, weakly acute at apex, basally pubescent, the claw 0.2–0.3 cm; keel petals 4–5 cm, attenuate at base, acute at apex, basally pubescent, the claw 0.1 cm. Stamens 4.5–5 cm long, glabrous; anthers 0.2–0.3 cm, basifixed, the connective tomentose. Gynoecium sessile 4–5 cm long, densely sericeous, except the glabrous apex, the hairs long; ovary 8 × 2 mm, oblong; style 3.2–4.2 cm. Fruits and seeds not seen. Fig. 1.

DISTRIBUTION. *Mucuna persericea* is known from Maui Island, Hawaii (Map 1).

SPECIMENS EXAMINED. HAWAII. Maui Island, Makawao, fl., Mann & Brigham 395 (A); Keanae Valley, 19 July 1927, fl., Degener & Wiebke 2286 (holotype K; isotypes A, BISH n.v., NY, US); Keanae Valley, 19 July 1929, fl.,



Map 1. Distribution of the native species of *Mucuna* in the Hawaiian Islands; *M. gigantea*, *M. persericea* and *M. sloanei*.

Degener 17011 (A, NY, US); 19 July 1929, fl., Degener 17991 (A, MO); ditch trail near Wailua-ilsé, 4 July 1961, fl., Degener 30175 (NY, US).

CONSERVATION STATUS. The species meets the IUCN Red List criteria to be listed as Endangered (IUCN Standards and Petitions Subcommittee 2011). The extent of occurrence as defined by a minimum spanning polygon including all known collection localities is much less than 5000 km² and appears to be highly fragmented since there are only four known locations. Continuing decline is suggested by the fact that the species has not been collected since 1961 and that the existing collections were likely taken from native Hawaiian lowland forest, which continues to experience substantial reduction in area and quality due to destruction for development and invasion by non-native species.

PHENOLOGY. Flowering material has been collected in July.

NOTES. *Mucuna persericea* differs from *M. sloanei* by the internodes 1–1.5 cm long (vs 0.2–0.5 cm in *M. sloanei*), the rachis of the inflorescence 10–13 cm long (vs to 1–2 cm long), the abaxial surface of the leaflets more densely pubescent, with longer hairs (0.1–0.2 cm vs mostly less than 0.1 cm) and the flowers 4–5 cm long (vs 5.5–7.5 cm long). While *M. sloanei* is a widespread species, occurring in tropical America, the Pacific, and west-central Africa, *M. persericea* is narrowly endemic to the windward lowlands of western Maui. Wilmot-Dear (1990) suggested that while *M. sloanei* is a native species in Hawaii, where it occurs on most of the main islands, its presence on Maui might be due to human-mediated introduction.

In addition to the two aforementioned species, *Mucuna* is also represented in Hawaii by *M. gigantea*. This is a widespread taxon in the Pacific Islands. Additionally Wilmot-Dear (1990) reported the occurrence in Hawaii of six non-native taxa of *Mucuna* found as cultivated plants: *M. bennettii* F. Muell. (Mueller 1876: 63), *M. elegans* Merr. & L. M. Perry (Merrill & Perry 1942: 406), *M. miniata* Merr. (Merrill

¹ Locality spelled 'Keauae' in publication, 'Keanae' on label. Kaena is the correct spelling

1917: 278) (currently *M. miniata* is considered a synonym of *Mucuna warburgii* K. Schum. & Lauterb. (Schumann & Lauterbach 1901: 365)), *M. platyphylla* A. Gray (1854: 443) (under the name *M. albertisii* F. Muell. (Mueller 1876: 64 – 75)), *M. pruriens* var. *utilis*

(Wall. ex Wight) Baker ex Burck (Baker 1893: 187), and *M. novo-guineensis* Scheff. (Scheffer 1876: 18). Any of these alien species might be expected to have become naturalised in Hawaii. A key to aid in the identification of the species of *Mucuna* in Hawaii follows:

Key to the native species of *Mucuna* from Hawaii

1. Corolla red or red-orange; inflorescence arising from defoliate portion of branches; abaxial surface of the leaflets with sparse trichomes 2
2. Stipels absent; calyx teeth indistinct, ≤ 1 mm long. **M. novo-guineensis**
2. Stipels present; calyx teeth longer than 5 mm. 3
3. Calyx with the lobes less than 30% of the total length; inflorescence rachis 2 – 2.5 cm long, the internodes c. 0.5 cm long **M. elegans**
3. Calyx with the lobes at least 50% of the total length; rachis c. 20 cm long, the internodes 1 – 1.5 cm long 4
4. Apical leaflet c. twice as long as wide, to 9 cm long **M. miniata**
4. Apical leaflet c. 1.5 times as long as wide, 11 cm long or more. **M. bennettii**
1. Corolla greenish white, yellow or purple; inflorescence usually arising from leaf axils; abaxial surface of the leaflets usually densely pilose 6
5. Inflorescence with the secondary axes distinct, ≥ 0.5 cm long; corolla white or greenish white 7
6. Indumentum on the abaxial surface of the leaflets dense and erect; keel curved throughout length. **M. platyphylla**
6. Indumentum on the abaxial surface of the leaflets sparse and adpressed; keel not curved throughout length (straight for most of its length). **M. gigantea**
5. Inflorescence with the secondary axes indistinct, knob-like; corolla usually purple or yellow. 8
7. Plants herbaceous vines; corolla usually purple **M. pruriens** var. **utilis**
7. Plants woody lianas; corolla yellow. 9
8. Trichomes on the abaxial surface of the leaflets mostly less than 0.1 cm long; primary axis of inflorescence 1 – 1.5 cm long, the internodes c. 0.2 – 0.5 cm long; flowers 5.5 – 7.5 cm long **M. sloanei**
8. Trichomes on the abaxial surface of the leaflets 0.1 – 0.2 cm long; primary axis of the inflorescence c. 12 cm long, the internodes 1 – 1.5 cm long; flowers 4 – 5 cm long **M. persericea**

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