

THE GENUS *MASTERSIA* (PAPILIONACEAE: PHASEOLEAE)

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SUMMARY

Characteristic for the genus *Mastersia* are the indehiscent pods with seeds with elongated funicles. Within this genus only two species are recognized: *M. assamica* Benth. from Assam and *M. bakeri* (Koord.) Backer from Borneo, Celebes and the Moluccas. Both species are considered closely related; distinctive characters are found in the bracteoles, wing petals, keel petal and pod. *Mastersia* is placed within the Phaseoleae in the subtribe Glycininae-Glycinastrae. The distribution pattern of both species is discussed.

INTRODUCTION

The genus *Mastersia* was first described by Bentham (1865a), with *M. assamica* (Bentham, 1965b) as its only species, based on specimens collected in East India by Griffith and Wallich. Bentham commemorated with this new genus name the labours of Dr. T. Maxwell Masters. Baker (1876) described *M. cleistocarpa*, using the same material as Bentham did and thereby creating a superfluous name. Prain (1897) recognized Baker's mistake and sunk the latter name correctly into the synonymy of *M. assamica* (see note under the latter).

Koorders (1898) described *Mucuna bakeri*. Backer (in Heyne, 1927) corrected the generic identity and made the combination in *Mastersia*. See also note 1 under *M. bakeri*.

Harms (1911) described two new species: *M. sarasinorum* (Celebes) and *M. borneensis* (Borneo), both slightly different from each other and from *M. assamica*. In the present study both species are reduced to *M. bakeri* (see note 2 under this species).

MORPHOLOGICAL NOTES

Leaves (Fig. 1a) — The leaves are spirally arranged and pinnately trifoliolate. Stipulae and stipellae are present, but early caducous. The leaflets are pilose, but lose the hairs during maturation, especially on the upper side. Hairs on veins and nerves usually are more permanent. Mature leaflets of *M. assamica* show a tendency to be earlier devoid of hairs on the upper surface than leaflets of *M. bakeri*. The hairs are uniseriate, 3-celled (Lackey, 1978).

For *M. bakeri* Lackey (l.c.) also reports the presence of stalked and unstalked, small glands. These are not always present, as he does record *M. borneensis* (a synonym) as devoid of these glands.

The upper surface of the leaflets lacks stomata. Paraveinal mesophyll may be present (Lackey, l.c.).

Inflorescence (Fig. 1a & b) — The inflorescence consists of a pseudoraceme: a raceme with fascicles which are contracted into brachyblasts. These brachyblasts are cushion-shaped and bear three flowers, of which usually only one matures. At both sides of the base of the inflorescence small, early caducous bracts are present, covering a dormant bud.

Bracteoles — In both species two opposite bracteoles are present just below the calyx. Because of the numerous veins they appear to be striated. The bracteoles often are persistent in fruit. In *M. assamica* they are, at the vexillary side, overlapping at the base; in *M. bakeri* they are somewhat smaller and only touching at the base.

Calyx — The two dorsal sepals are completely connate and the calyx is, therefore, 4-lobed. The ventral lobe is elongated. Remnants of the calyx are present in almost ripe fruits.

Standard petal — The standard lacks auricles and possesses two small, basal callosities. The standard in *M. assamica* is short-clawed, that in *M. bakeri* is usually sessile or very short-clawed.

Wing petals (Fig. 1e & g) — The wing petals are short-clawed and have a distinct upper auricle and only in *M. assamica* also a distinct lower one. In *M. bakeri* the lower auricle is only slightly developed. Besides the lateral pocket as a landing platform for insect pollinators (Stirton, 1981), *Mastersia* also has a lamellate sculpturing above the pocket. This is somewhat exceptional, as legumes usually only possess one of these structures. The sculpturing in *Mastersia* is usually only slightly developed and only distinct in specimens of the Moluccas (*M. bakeri*). The lamellae are present in the upper central part of the blade, they are exposed and in a vertical to slightly reclined position (terminology after Stirton, 1981). Within the Phaseoleae sculpturing is not rare, about a third of all genera show a kind of sculpturing (Stirton, l.c.).

Keel petals — Both petals are partly united, from just below the apex to the claw. In *M. assamica* the transition from claw to blade is rather sharp, in *M. bakeri* more gradual. An upper auricle is present. The lateral pocket is always present near the upper margin in *M. bakeri*, but in *M. assamica* more often in the middle of the blade.

Stamens — The vexillary filament is completely free from the other 9, which are for more than half of their length connate. In young stages the stamens are alternately longer and shorter (with the vexillary one being shorter), but at the time of reflection of the standard all are of the same length. Remnants of the filaments are usually persistent at the base of the pod.

Fruit (Fig. 1c & f) — The fruit is, in proportion to its length and breadth, flat and thin. *Mastersia assamica* has pods with a narrow wing along the upper edge only, *M. bakeri* has wings on both edges. The pod is indehiscent and breaking up into irregular, usually one- or two-seeded parts. In a dried state the pod always appears to be black, but field observations indicate a change in colour from light green to reddish yellow to black.

Seeds (Fig. 1d) — The seeds are small and reniform. Their placement within the pod is unique in the Phaseoleae, the seeds are attached to a much elongated funicle and hang vertically in the horizontal pod. Usually pairs of seeds face each other with their funicle. Most seeds per pod are abortive, lacking a well-developed embryo; only few seeds show a developed embryo (the larger, still young seeds in fig. 1c & f).

SYSTEMATIC POSITION

Bentham (1865a) placed *Mastersia* in his subtribe Galactiinae of the Phaseoleae. He considered *Mastersia* to be related to *Dioclea* and *Pueraria* (both Diocleinae). The Diocleinae differ (in his system) from the Galactiinae in the vexillary stamen, which is partly connate with the staminal tube in the Diocleinae and free in the Galactiinae (free in *Mastersia*).

Taubert (1894) placed *Mastersia* in the Galactiinae too. Harms (1911) supported Bentham's view and allied *Mastersia* with *Pueraria*, because of the heavy staminal tube, the large disk, the large, somewhat winged pod, and the *Pueraria*-like lower auricle of the wing petal. Hutchinson (1964) followed Bentham, but raised the Galactiinae to tribal rank.

Lackey (1977a & b), after investigation of the chromosomes, leaf anatomy and chemotaxonomy of all the Phaseoleae, basically maintained Bentham's vision and placed *Mastersia* (with a question mark, however) in the Glycininae. In Lackey's concept the Glycininae include all Galactiinae sensu Bentham. The Glycininae have inflorescences, which are not or only slightly nodose, while the Diocleinae usually possess prominent nodose inflorescences (the Galactiinae sensu Bentham also have nodose inflorescences, so this character is rather subjective). Lackey allies *Mastersia* with *Shuteria*, because of the reniform seeds with long funicles.

Baudet (1977, 1978) made a different classification of the Phaseoleae, also based on an elaborate study. Baudet subdivided the tribe into three subtribes, instead of the traditional six or seven. His groups are based on differences in development of the style. *Mastersia* belongs to his Glycininae-Glycinastrae (the Glycininae contain the former Diocleinae, Glycininae s. s., Erythryrinae, Ophrestinae, and Kennediinae). The Glycininae are the more primitive group with a simple style, not bipartite as in the Cajaninae and the Phaseolinae.

Mastersia is a distinct genus, because of its pod and seed connection (see also Bentham, 1865a). Its placement was traditionally within the Galactiinae or the Glycininae (in Lackey's concept), because of the, within the Phaseoleae, rather primitive flower of *Mastersia*. The flowers lack appendages on the standard, the wing petals do

not enclose the keel petals, the style is not much elongated as in Phaseolinae, nor does the style possess a beard. The leaflets are not glandular dotted as in the Cajaniinae. Unfortunately, the traditional concept is not fully satisfactory, because of transitions among the subtribes. Therefore Baudet's solution, with an enlarged concept of the Glycininae, seems to be the most appropriate classification, with *Mastersia* being placed in the Glycinastrae.

GEOGRAPHY

The genus *Mastersia* shows a disjunct distribution, with two vicariant species: one is found in Assam (India), the other in a small area of Indonesia on both sides of the deep Makassar Strait (Borneo/Celebes, Moluccas).

Clayton & Panigrahi (1975) published a chorology of Indian grasses. Compared to the distribution patterns they found, *M. assamica* fits into the group of Naga-Khasia endemic species (their map 12a). The genus *Mastersia* itself shows a Southeast Asia-Malesian distribution (belonging to the 25% isochore of their map 6), but can also be placed in the group of plants with a Deccan-Malesian sub-kingdom distribution (50% isochore of map 2).

The latter distribution agrees with a pattern found by Van Steenis (1979) for Malesian plants. *Mastersia* belongs to his group of Indo-Malesian widespread plants (his figures 7 & 8). *Mastersia bakeri* itself does not fit easily in any pattern, the best description is that of a Wallacea-ranging species (fig. 18). Van Steenis (1932) drew attention to this peculiar distribution in his treatment of the Styracaceae with a more or less similar distribution as *M. bakeri*. Erroneously, Van Steenis (1932) also included Irian Jaya in the distribution range, from which *M. bakeri* is absent; this is perhaps due to misidentifications in the Bogor herbarium.

Mastersia is presumably Laurasian in its origin. Dispersal to Borneo could have occurred during glacial periods when the Sunda Shelf was dry. The presence of *Mastersia* on both sides of the Makassar Strait is less easily explained, as this strait is deep. Audley-Charles (1981) indicates that Makassar Strait existed already 'since the Eocene or Cretaceous (80–40 Ma), except perhaps at the southern end, where via the Doandoany shoals region, a line of islands and/or even extensive land may have allowed landplants and animals to migrate from Borneo into southeast Celebes during the late Pliocene (from 8 Ma onwards).' Audley-Charles' table 4.1 also shows that during the Mid-Miocene (± 20 Ma) another possible crossing of Makassar Strait existed. Table 4.1 also shows that during the Late Miocene to Late Pliocene (± 12 –3 Ma) an island chain was established between East Celebes and Australia, enabling *Mastersia* to migrate further eastwards to the Moluccas. The latter region is, geologically seen, not well-known. The present distribution suggests an extinction in the area between Assam and Borneo, perhaps due to the wetter climate during interglacial periods. A wetter climate does not only affect the plants themselves, it may also affect the pollinators (*Mastersia* has pods with only few seeds with well-developed embryos). Raven & Polhill (1981) noted the relatively poor representation of legumes

in tropical Asia compared to Africa and America. Unfortunately, no palaeontological data exist to support the above suppositions.

The distribution of *M. bakeri* has been enlarged by introduction in Java, where the plant occasionally is used as a cover plant or as a fertilizer (Backer & Bakhuizen van den Brink f., 1964). See also the note on uses under the description of the species.

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MASTERSIA

Mastersia Benth. in Benth. & Hook. f., *Gen. Pl.* 1 (19 Oct. 1865) 535; Benth., *Trans. Linn. Soc.* 25 (2 Nov. 1865) 300, t. 34; Taub. in E. & P., *Nat. Pfl. Fam.* 3, 3 (1894) 368; Hutch., *Gen. Pl. Pl.* 1 (1964) 431; Allen & Allen, *Leg. Nod.* (1981) 422, 423, 722. – Type: *M. assamica* Benth.

Herbaceous to woody, creeping or twining or climbing plants. Stem round to somewhat ribbed. Vegetative parts all short-pubescent when young. *Leaves* spirally arranged, pinnately trifoliolate. Stipulae triangular to lobed at the apex, caducous, leaving a convex to revolute scar. Rachis pulvinate at base, infrajugal parts much longer than ultrajugal parts. Stipellae triangular. Petiolules pulvinate. *Leaflets* sometimes rhomboid to usually elliptic to ovate; base acute to usually rounded to sometimes slightly emarginate; margin entire; apex rarely retuse to usually acute to sometimes cuspidate; lateral leaflets usually somewhat smaller than the apical leaflet; the former usually asymmetric with the basiscopic side being larger than the acroscopic side; upper surface of mature leaves usually devoid of hairs, except for sometimes the nerves and veins, stalked and unstalked glands occasionally present; nervature indistinct on upper surface, distinct on lower surface, nerves alternately on either side of the midrib, parallel to the base of the leaflet, veins slightly perpendicular to the nerves. *Pseudoracemes* axillary and terminal, with 2 small, often caducous bracts at the base. Brachyblasts 3-flowered, of which 1 or 2 often caducous. Bracts to the brachyblasts and to the flowers triangular, caducous. *Bracteoles* 2, just below the calyx, overlapping or touching dorsally, very broadly obovate, striately nerved, pubescent, apex broadly rounded, (sub)persistent in fruit. Flowers papilionate. *Calyx* campanulate, 4-lobed, lobes imbricate, longer than cup, sericeous outside, glabrous inside, persistent in fruit; lower lobe elongated, keeled; upper lobe slightly keeled at apex. Corolla glabrous. *Standard* elliptic to broadly ovate, claw absent to short; base not auricled; basal callosities distinct; margin entire; apex rounded. *Wing blade* narrowly elliptic, equal to or slightly shorter than the keel; claw short; upper auricle distinct, lower auricle slightly to distinctly developed; lateral pocket present; sculpturing slightly to distinctly developed in upper central part, lamellate, vertically to slightly reclined, exposed. *Keel blade* elliptic to oblong, partly connate from just beneath the apex to the claw; the latter short to relatively long; upper auricle present; lateral pocket present in middle of petal or at the upper margin near the auricle. Vexillary filament free, not appendaged; filaments alternately shorter and longer when young; anthers uniform, ellipsoid, dorsifixed, introrsely opening with two lateral longitudinal slits. Disk annular, consisting of 10 free to somewhat adnate short lobes. Ovary pubescent, laterally compressed; style laterally compressed near ovary to circular near stigma, curving upwards; stigma capitate; ovules c. 20. *Pod*

pergammentaceous, linear-oblong, very flat, indehiscent, with a longitudinal wing on both or on the dorsal edge only; exocarp dark brown; endocarp whitish brown, inside sometimes with soft tissue. *Seeds* longitudinally arranged, perpendicular to the length of the pod, seeds usually with the funicles pair-wise facing each other, reniform, smooth, laterally flattened, blackish brown, with most seeds not bearing full-grown embryos; seeds with two fleshy layers, outer dark brown, inner brownish white; funicle elongated; rim aril brownish white; hilum small, round; micropyle in a slightly raised radicular lobe. *Embryo* with a long radicle folded towards the micropyle; plumule minute.

Distribution. Two species, one in Assam, the other in Malesia: North Borneo, Central and North Celebes, Moluccas.

Ecology. Found in secondary forest on waste places, on wet to dry ground.

Nodulation. Allen & Allen (1981) reported *Mastersia* to nodulate in its roots. See also the note on uses under *M. bakeri*.

Secondary metabolites. Lackey (1977b, see under References) records canavanine for the seeds.

KEY TO THE SPECIES

- 1a. Bracteoles at the vexillary side overlapping at the base. Wing blade with distinct lower auricle. Keel with a rather sharp transition between claw and blade; pocket usually in middle of blade, sometimes at the upper edge. Pod with a 1–2 mm broad wing on the upper edge only. Assam **1. *M. assamica***
- b. Bracteoles at the vexillary side only touching at the base. Wing blade with an indistinct lower auricle. Keel with a gradual transition from claw to blade; pocket always on the upper edge. Pod with a 1–3 mm broad wing on both edges. Borneo to Moluccas **2. *M. bakeri***

1. *Mastersia assamica* Benth. — Fig. 1f & g.

M. assamica Benth., Trans. Linn. Soc. 25 (1865) 300, t. 34; Prain, J. As. Soc. Beng. 66, ii (1897) 417. — *M. cleistocarpa* Baker in Hook. f., Fl. Br. India 2 (1876) 195, nom. superfl. — Syn- types: *Griffith s.n. in Hb. Royle 515, 522 (K)*, 1824; *Wallich s.n. (K, L)*, E. India, Mishmee Hills and near Choonpara in Upper Assam. See note.

Stipules already caducous, scar convex. Rachis, infrajugal part 6.5–12(–18) cm long; ultrajugal part 1.2–3(–5.5) cm long. Stipellae (2–)5–8 by 0.5–1.2 mm. Petioles 4–6 mm long. *Leaflets* 5–17.5 by 3.5–12.5 cm; acumen 6–9 mm; nerves 6–12 on each side of the midrib; usually only pubescent on the lower surface. *Pseudoracemes* 15–68 cm long; bracts caducous. Brachyblasts 1.5–4 mm long. Bracts to the brachyblasts and to the flowers already caducous. Pedicel 5.5–11 mm long, sparsely pubescent. *Bracteoles* dorsally overlapping at base, (3.5–)5–7 by (2.8–)3–4 mm. Flower up to 18 mm long. *Calyx* with a 4–5 mm long cup; ventral lobe 9–12 by 4–5.5 mm; lateral lobes 7–9 by 3–5 mm; dorsal lobe 7–10 by 6.5–8 mm. *Standard blade* broadly ovate, 11–18 by 10–13 mm; claw short, 1–2 mm long. *Wing*

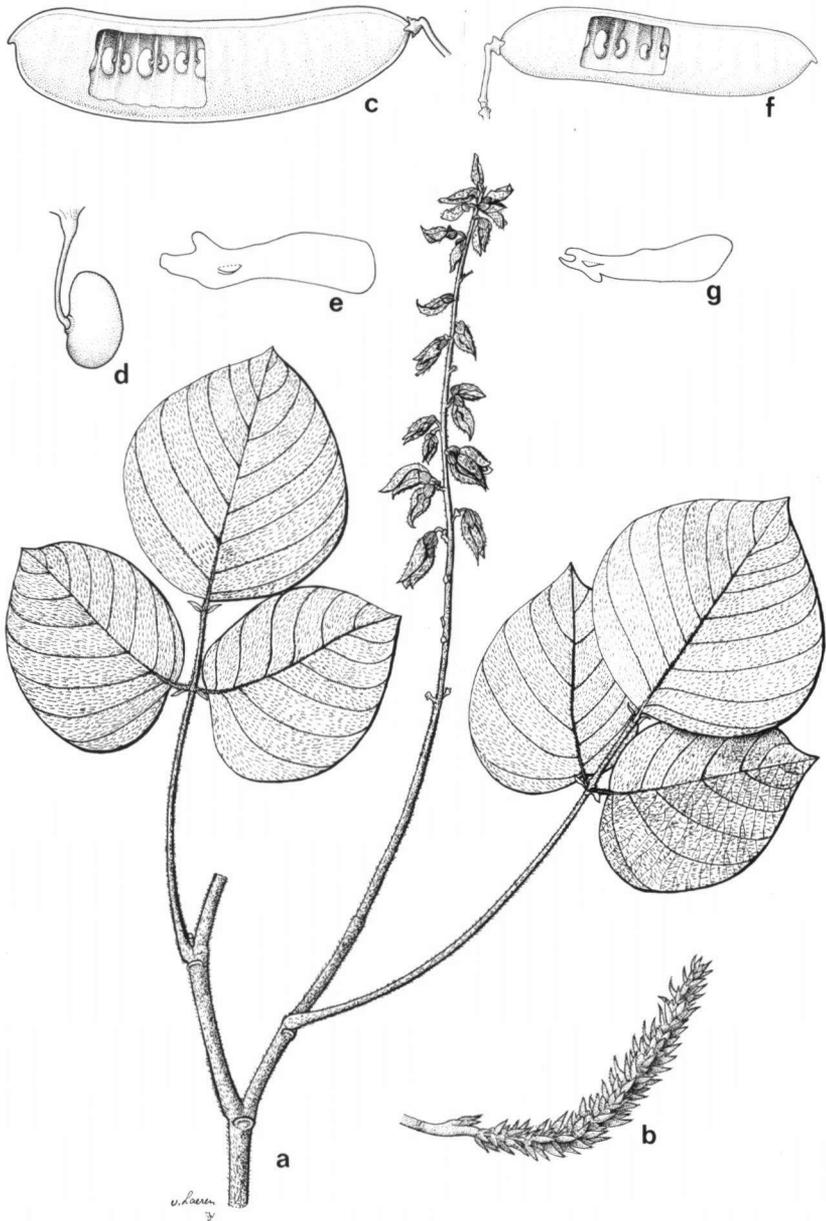


Fig. 1. *Mastersia bakeri* (Koord.) Backer. a. Habit, $\times \frac{1}{2}$; b. young inflorescence, $\times 1$; c. pod with arrangement of young seeds, $\times \frac{1}{2}$; d. seed, $\times 2\frac{1}{2}$; e. wing petal, $\times 2\frac{1}{2}$ (a, c, d *de Vogel* 5639, b *SAN* 26681, e *Kanders* 272). — *M. assamica* Benth. f. Pod with arrangement of young seeds, $\times \frac{1}{2}$; g. wing petal, $\times 2\frac{1}{2}$ (f, g *Tessier* 204).

blade 9–16 by 3–4 mm; claw 1–3.5 mm; lower auricle distinct; sculpturing indistinct. *Keel blade* 6–11 by 5–7 mm; claw 4.5–5 mm long; transition between claw and blade rather sharp; lateral pocket usually present beneath the upper margin in middle of blade. *Staminal tube* and free part of filaments 12–15 mm long. Disk lobes 0.7–1.5 mm long. Ovary 10.5–13.5 mm long; style 4.5–5 mm long, curving upwards. *Pod* 6–13.5 by 1.8–2.9 cm; longitudinal wing on upper edge only, 1–2 mm broad. *Seeds* 6–20, all dissected seeds without a well-developed embryo.

Field notes. Flowers pink to deep red. Young pods green.

Distribution. India: Assam.

Ecology. Plant climbing in trees; growing on moist soil in an area with a yearly drought. Occurrence not rare. Altitude 80–1250 m.

Note. Baker has presumably not seen Bentham's description of *M. assamica*, only the generic description in the Genera Plantarum 1 (proved by the use of the same generic name). Also because Bentham had not annotated his material, Baker thought he described a new species when he created the superfluous epithet *cleistocarpa*.

2. *Mastersia bakeri* (Koord.) Backer — Fig. 1a–e.

M. bakeri (Koord.) Backer in Heyne, Nutt. Pl. Ned. Ind. 2nd ed., 2 (1927) 828; Holthuis & Lam, Blumea 5 (1942) 194; Backer & Bakh.f., Fl. Java 1 (1964) 631. — *Mucuna bakeri* Koord., Minah. (1898) 439, 630; Suppl. Cel. 2 (1922) pl. 16; Suppl. Cel. 3 (1922) 9. — Lectotype: *Koorders 17702* (L); syntype: *Koorders 17705* (L), Celebes, Minahassa, Manado. See note 1.

M. borneensis Harms in Fedde, Rep. 9 (1911) 369; Merr., J. Str. Br. Roy. As. Soc., Spec. No. (1921) 310; Sarawak Mus. J. 3 (1928) 524; Pl. Elm. Born. (1929) 109. — Type: *Winkler 2211* (B lost, L, SING), Southeast Borneo, Hayoep.

M. sarasinorum Harms in Fedde, Rep. 9 (1911) 369. — Type: *Sarasin 250* (B lost), Celebes, Kema. See note 2.

Stipules 3.5–6 by 1.5–4 mm, scar convex to revolute. Rachis, infrajugal part 8–15(–18) cm long; ultrajugal part 1.5–3.8 cm long. Stipellae 2.5–6 by 0.7–2 mm. Petiolules 6–8 mm long. *Leaflets* 4.5–15.5 by 3.5–14 cm; acumen 3–7 mm long; nerves 6–14 on each side of the midrib; usually pubescent on upper and especially lower surface, stalked and unstalked glands occasionally present. *Pseudoracemes* 6–30 cm long; bracts ovate, cuspidate, c. 4.5 by 1.2 mm. Brachyblasts 0.5–3(–6) mm long; bracts c. 2 by 1 mm. Bracts to the flowers c. 1.5 by 0.8 mm. Pedicel 1.5–5 mm long, sparsely pubescent. Bracteoles dorsally touching at base, 1.5–5 by 1–3 mm. Flowers up to 20 mm long. *Calyx* with a 3–5 mm long cup, ventral lobe 7–14 by c. 4 mm; lateral lobes 6–1 by c. 4 mm; dorsal lobe 7–14 by c. 5 mm. *Standard* elliptic to broadly ovate; blade 8–14(–17) by 6–9(–11) mm; claw absent to occasionally up to 1 mm long. *Wing blade* 8–14(–16) by 2.5–3.5(–4) mm; claw 1.5–2.5 mm long; lower auricle slightly developed; sculpturing indistinct to distinct. *Keel blade* 12–18 by c. 6 mm; claw 2.5–3.5 mm long; transition between claw and blade gradual; lateral pocket present at the upper margin. *Staminal tube* and free part of filaments 12–16 mm long. Disk lobes 0.5–2 mm long. Ovary c. 10 mm long; style c. 6 mm long, curved upwards after sometimes a slight downward bend. *Pod* 5–13 by

2–3 cm, with longitudinal wings along both edges, dorsal wing 1–1.5 mm broad, ventral wing 2–3 mm broad. *Seeds* 5–20; funicle c. 5 mm long; embryo c. 5.5 by 2.5 mm; radicle c. 2 mm long.

Field notes. Climber, 7.5–18.5 m long, girth 5–12.5 cm. Inner bark pale green. Leaves dark to glossy green on upper side, light green on lower side. Calyx varying from green when young to dark crimson and reddish brown when mature. Corolla varying from green when young via yellow and pink to dark red, crimson when mature; standard with green spot on the inside near its base. Smell faint. Fruits green when young, via green-yellow and reddish yellow turning black. Seeds dark, greyish brown.

Distribution. North Borneo, Central and North Celebes, Moluccas. Occasionally cultivated in Java (see uses).

Ecology. In primary and secondary forest on waste grounds, especially in open spots; from flat grounds to hillsides; on wet (like riverbanks) to dry places. One soil type recorded: yellow, clayish sand on hill of volcanic tuff. Occurrence varying from some plants to being present in groups to being common; found from sealevel up to 900 m altitude.

Vernacular names. N. Celebes (Sulawesi utara): lambuow, tatamulak, tontagis. Moluccas: abèlé (Morotai I.), rarau (N. Halmahera: Gal.), woléwon (S. Halmahera: Weda).

Uses. According to Heyne (1927) appreciated in N. Celebes as a good coverplant, which prevents the dominating establishment of alang-alang grasses. The plant can be used as a fertilizer too, as it nodulates easily and produces much litter. It is recommended as a coverplant in plantations, except in tea plantations because of its climbing habit. It is sometimes used in Java too (Backer & Bakh. f., 1964).

Pollen. I.K. Ferguson & J.J. Skvarla (The pollen morphology of the subfamily Papilionoideae (Leguminosae). In: R.M. Polhill & P.H. Raven, *Advances in legume systematics* 2, 1981, 886, 888, pl. 11: G, H) report that the grains of *M. bakeri* are 'less specialised'; they are subprolate, margocolporate, reticulate with granules in the lumina. Endexine is much narrower and the foot layer much broader in comparison with the grains of *Pueraria phaseoloides*.

Notes. 1. The oldest, legitimate epithet for this species is *bakeri*. Backer (see Koorders, 1922) was the first to make the new combination within *Mastersia* in a manuscript. Koorders (1922), however, published the new combination, but in a very peculiar way: '*Mucuna bakeri* Kds. (= *Mastersia bakeri* (Kds.) Back.)'. Under plate 16 the new combination within *Mastersia* is printed even smaller. Although most authors refer to Koorders (1922), it is obvious that the combination was not accepted by Koorders, merely cited as a synonym, and consequently not valid (Art. 34 ICBN). Then the first valid publication of the new combination is in Heyne (1927) by Backer (the introduction of the reprint of the first edition (1922) of Heyne's book acknowledges the aid of Backer).

2. The type of *M. sarasinorum* Harms was not studied, because of loss of the material. The name has been placed into the synonymy of *M. bakeri* because of two reasons. Firstly, the differences Harms (1911) has described among *M. sarasinorum* and

the other two species (*M. assamica* and *M. borneensis* = *M. bakeri*) are minimal. The most important differences are that *M. sarasinorum* has smaller bracteoles and a calyx with a shorter cup and with a relatively longer ventral lobe. Secondly, later collected material from Celebes and the Moluccas is only very slightly different from that of Borneo, leaving no doubt that only one slightly variable species is present. The plants of the Moluccas show often (but not exclusively) wing blades with a distinct sculpturing near the upper auricle, which is only slightly developed in the other specimens of other islands. The plants of Celebes show a style, which sometimes bends a little downwards before curving upwards.

COLLECTIONS STUDIED

Unnumbered collections have not been included. 1 = *M. assamica*; 2 = *M. bakeri*.

A 2057: 2; 3218: 2 – van Balgooy 3580: 2 – Beguin 1905: 2; 2108: 2 – Bor 16347: 1 – Brooke 10148: 2 – BS 425: 2 – Burut 3096: 2 – Clarke 40752: 1 – Clemens 10070: 2; 21294: 2 (mixed with *Dioclea hexandra*); 21794: 2; 27321: 2 – Curran 3439: 2 – Elmer 21186: 2 – Endert 2390: 2; 4958: 2 – Eyma 3247: 2 – Geesink 8916: 2 – Griffith 515: 1; 522: 1; 694: 1; 1824: 1 – de Haan 1807: 2 – Hulstijn 246: 2 – Idjan & Mochtar 222: 2 – Joseph 48913: 1 – U. Kanjilal 4225: 1 – Kaudern 272: 2 – Koorders 17698: 2; 17702: 2; 17705: 2 – Kostermans 21300: 2 – Lam 3500: 2 – Lewis 306: 2 – Monod de Froideville 71: 2 – van Ooststroom 12698: 2 – Panigrahi 21605: 1 – Prain 204: 1 – Purseglove 5179: 2; 5414: 2 – Ras 10787: 1 – SAN 26681: 2; 57052: 2; 70610: 2; 71053: 2; 79130: 2; 79789: 2; 79833: 2; 81018: 2; 83919: 2 – SF 6705: 2 – Tessier 204: 1 – de Vogel 3816: 2; 5639: 2 – Winkler 216: 2; 2211: 2 – Yoshida 2362: 2.