

THE DISTINCTION OF FIVE MALLOTUS SPECIES FORMERLY IN SECTION HANCEA (EUPHORBIACEAE)

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SUMMARY

Mallotus concinnus Airy Shaw, *M. havilandii* Airy Shaw, *M. insularum* (Airy Shaw) Slik, and *M. mi-quelianus* (Scheff.) Boerl. are very similar in appearance, with opposite leaves of which one large and elliptic, and the other reduced and more or less obcordate. However, a detailed look revealed enough differences to regard them as distinct species.

Key words: Euphorbiaceae, *Hancea*, *Mallotus*.

INTRODUCTION

Mallotus Lour. is one of the larger genera in the Euphorbiaceae with c. 150 species, which are mainly found in Southeast Asia and the Malay Archipelago, but there are also some species in Africa and the Indian Ocean. The genus is divided into several sections of which some are distinct, but others appear to be poly- or paraphyletic (e.g., Slik & Van Welzen, 2001a). One well-defined section is *Hancea*. This group of species has opposite leaves of which one is reduced and stipule-like. This section only became really distinct after several species were excluded (Slik & Van Welzen, 2001b).

Recent morphological studies (Sierra, pers. comm.) and phylogenetic analyses based on sequence data (Kulju, pers. comm.) show that section *Hancea* and the monotypic section *Oliganthae* (*M. subpeltatus* (Blume) Müll. Arg.) are not closely related to *Mallotus* and they will be united with another genus in a forthcoming paper (Sierra et al., ms.). *Hancea* s.s. and *Oliganthae* lack typical *Mallotus* characters like glandular scales (more or less sessile, flat, glandular hairs), stellate hairs, and extrafloral nectaries on the leaf blades. On the other hand, they show club-shaped glandular hairs (sometimes minute but always stalked and globular; absent in *Mallotus* s.s.) and a single staminate flower per bract instead of several as in *Mallotus* s.s. (this is contrary to Slik & Van Welzen, 2001b, who still note 1–6 flowers per bract). The excluded species show the typical *Mallotus* s.s. characters and lack those of section *Hancea* (except for *M. brachythyrus* Merr., see below).

In this paper we will discuss the species excluded from section *Hancea*. Slik & Van Welzen (2001b) indicated that they have to be included in the sections *Axenfeldia* and/or *Rottleropsis*. Both sections also have opposite leaves, mainly pinnate-nerved in *Axenfeldia* and triplinerved in *Rottleropsis*. This difference in venation shows overlap and

Table 1. Comparison between the four species of *Mallotus* with a normal and an obcordate opposite leaf. In **bold** the typical characters for the species.

Species	Stipule sizes (mm)	Stipule length/ width ratios	Non-reduced leaf blade sizes (cm)	Non-reduced blade bases	Basal extra floral nectaries	Apical extra floral nectaries
<i>M. concinnus</i>	1.2–1.5 by 0.5–0.8	1.8–2.4	6.8–13.2 by 2.5–5.2	± symmetric	1 or 2 pairs, small (< 0.5 mm)	absent
<i>M. havilandii</i>	6–11 by 0.6–1.5	7–10	11–24.5 by 3.5–8	± symmetric	several large (> 0.5 mm)	on nerves
<i>M. insularum</i>	1.5–4.5 by 0.4–1	3.75–4.5	6.4–19 by 2.7–6.2	± symmetric	1–3 pairs, small (< 0.5 mm)	absent
<i>M. miquelianus</i>	4–13 by 1.8–3	2.2–4.3	7–32 by 2.5–13	asymmetric one side often not half heart-shaped	several large (> 0.5 mm)	between nerves

Species	Stellate hairs beneath	Glandular hairs beneath	Hairs beneath	Staminate infl. length (cm)	Pistillate infl. length (cm)	Hairs on inflorescences
<i>M. concinnus</i>	absent to rare	many	subglabrous	?	up to 1.5 cm	subglabrous?
<i>M. havilandii</i>	distinct	many	hairy venation	up to 23 cm	up to 27 cm	tomentose
<i>M. insularum</i>	distinct	many	subglabrous to hairy	up to 9.5 cm	up to 5 cm	tomentose
<i>M. miquelianus</i>	absent to rare	absent or few	subglabrous (to hairy venation)	up to 13.5 cm	up to 10 cm	subglabrous

Species	Staminate bracts (mm)	Shape staminate buds	Pistillate bracts (mm)
<i>M. concinnus</i>	?	?	broken
<i>M. havilandii</i>	3–7 by 0.5–1	globose	4–10 by 0.8–1
<i>M. insularum</i>	1.3–4 by 0.5–0.8	ovoid (to globose)	3–5 by 0.8–1
<i>M. miquelianus</i>	1.5–3 by 0.9–1.7	ovoid (to globose)	3–4.5 by 1–2

phylogenetic analyses demonstrate both sections to be polyphyletic (Slik & Van Welzen, 2001a; Kulju, pers. comm.) or paraphyletic when united. The exact sectional division of *Mallotus* s.s. is still far from finished. The opposite leaves of *Axenfeldia* and *Rotteropsis* are similar in shape, but one is generally (much) smaller. The excluded species differ in this respect, they have leaf pairs which differ in shape, one is generally elliptic, the other stipule-like or more or less obcordate. The excluded species are: *M. brachythyrus*, *M. concinnus*, *M. havilandii*, *M. insularum*, and *M. miquelianus*. Of these species, *M. brachythyrus* resembles section *Hancea* the most: stipule-like leaves and a single staminate flower per bract (but with stellate hairs, extrafloral nectaries, and glandular scales like *Mallotus* s.s.). Phylogenies based on molecular data show *M. brachythyrus* to be close to *M. miquelianus* and both are part of *Mallotus* s.s. (Kulju, pers. comm.). Thus, the character states stipule-like leaves and single staminate flowers in *M. brachythyrus* are parallel developments with section *Hancea*. The other four species look quite alike and are usually referred to *M. miquelianus*, the most widespread species, ranging from Thailand to Borneo and the Philippines (map 9 in Slik & Van Welzen, 2001b). *Mallotus havilandii* is endemic on limestone close to Kuching, Sarawak (map 8 in Slik & Van Welzen, 2001b). *Mallotus insularum*, formerly a variety of *M. miquelianus*, is present in the Moluccas and the Lesser Sunda Islands (map 8 in Slik & Van Welzen, 2001b, omit Flores, see below).

Recently we came across the name *Mallotus concinnus*, also a limestone species, present in Kelantan, Peninsular Malaysia. When interpreting *M. concinnus* we first thought it to be a synonym of *M. miquelianus*, but synonymising this name with *M. miquelianus* would have a 'domino effect', other names, especially *M. insularum*, would then have to be synonymised too. Moreover, Slik & Van Welzen (2001b) do not indicate the differences between *M. havilandii*, *M. insularum*, and *M. miquelianus*. According to Slik (pers. comm.) it is unclear that *M. concinnus* and *M. insularum* can be separated. A careful comparison showed all four species to be distinct, but several specimens appeared to be wrongly identified, mainly as *M. miquelianus*. These are compelling reasons to write this article and to clarify the differences between the species.

COMPARISON

Table 1 summarises the differences among the four species (the very distinct *M. brachythyrus* is not included, see above). *Mallotus miquelianus*, the most widespread and most variable species, is easy to distinguish vegetatively. It is the only species with a very distinctly oblique base of the leaf blade, with often one side half heart-shaped and the other almost cuneate. Only one exception was found, *Soejarto et al. 8750* has a symmetric leaf base. Other leaf characters are the (almost complete) absence of stellate and glandular scales on the lower surface and the presence of apical extrafloral nectaries between the nerves (secondary veins) on the upper surface.

Also relatively well recognisable is *Mallotus havilandii*, with long and slender stipules (those of *M. miquelianus* are also long, but relatively broad) and the presence of apical extrafloral nectaries on the nerves on the upper surface (thus not between the nerves as in *M. miquelianus*). The stellate hairs are distinct. Most typical are the hairy and long inflorescences with very long staminate or pistillate bracts. The staminate

buds are globose instead of ovoid. The base of the leaf blade is symmetric in the sense that both sides are half heart-shaped, the base may be slightly oblique as meant in Slik & Van Welzen (2001b).

Mallotus concinnus and *M. insularum* (from West and East Malesia, respectively) show an extreme resemblance. A problem is that the flowers and fruits of *M. concinnus* are virtually unknown. Vegetatively the best character is the (near) absence of stellate hairs on the lower leaf blade surface in *M. concinnus* and the shorter stipules of this species.

Of *Mallotus insularum* only four specimens are known with a very disjunct distribution, two specimens are from the Sulu Archipelago, islands between Sulawesi and the Moluccas (*Bloembergen* 4482 and *Buwalda* 4575), and two specimens are from the Lesser Sunda Islands, present on the islands Bali (*W. Meijer* 10611) and Lombok (*Elbert* 2495) (Slik & Van Welzen, 2001b, tentatively added two specimens from Flores, *Schmutz* 2860 and *Schmutz* 3160, but these specimens are not *M. insularum*). The specimens from the Lesser Sunda Islands have somewhat larger leaves (8–19 cm long; NB: different from the description in Slik & Van Welzen, 2001b, due to exclusion of the Flores specimens) and larger stipules than the Moluccan specimens (leaves 6.5–13 cm long), but no other distinctive characters appear to be present. Therefore, due to lack of more specimens these entities are regarded as a single species.

Although three of the four species are already described (Slik & Van Welzen, 2001b) a key to them is still missing:

KEY TO THE SPECIES WITH AN OPPOSITE OBCORDATE LEAF

- 1a. Leaf base symmetric to slightly oblique, emarginate. Lower leaf blade surface with many glandular hairs, often also stellate hairs. Apical extrafloral nectaries on upper leaf blade surface absent or on the nerves (secondary veins) 2
- b. Leaf base oblique, asymmetric with one side half heart-shaped, the other almost cuneate. Lower leaf blade surface without or with very few glandular hairs, very seldomly a few stellate hairs. Apical extrafloral nectaries on upper leaf blade surface in between nerves **M. miquelianus**
(see Slik & Van Welzen, 2001b: 56, f. 22, map 9)
- 2a. Stipules 1.2–4.5 mm long, 1.8–4.5 times as long as broad. Apical extrafloral nectaries on upper blade surface absent (only basal ones present). Staminate inflorescences up to 9.5 cm long; staminate bracts 1.3–4 mm long (unknown for *M. concinnus*); pistillate bracts in *M. insularum* 3–5 mm long (broken, but small in *M. concinnus*).
— Peninsular Malaysia or Moluccas and Lesser Sunda Islands 3
- b. Stipules 6–11 mm long, 7–10 times as long as broad. Apical extrafloral nectaries on upper leaf blade surface on the nerves (secondary veins). Staminate inflorescences up to 23 cm long; staminate bracts 3–7 mm long, pistillate bracts 4–10 mm long.
— Borneo (Sarawak: near Kuching) **M. havilandii**
(see Slik & Van Welzen, 2001b: 52, f. 20, map 8)
- 3a. Stipules 1.2–1.5 mm long. Lower blade surface with simple hairs only. — Peninsular Malaysia **M. concinnus**

- b. Stipules 1.5–4.5 mm long. Lower blade surface with many stellate hairs. — Moluccas (Sulu Archipelago), Lesser Sunda Islands (Bali, Lombok) . . . **M. insularum** (see Slik & Van Welzen, 2001b: 54, f. 21, map 8)

DESCRIPTION OF MALLOTUS CONCINNUS

The other three species are described in Slik & Van Welzen (2001b).

Mallotus concinnus Airy Shaw

Mallotus concinnus Airy Shaw (1978) 406. — ?*Erismanthus* sp.: M.R. Hend. (1939) 70. — Type: Henderson SF 19543 (holo K; iso K, SING), Malaya, Kelantan, Gua Panjang, Gua Ninik.

Shrub, up to 3 m tall; branchlets terete, up to 3 mm thick. *Indumentum* sparse, very short simple or stellately bundled hairs and yellowish glandular scales. *Stipules* early caducous, triangular, 1.2–1.5 by 0.5–0.8 mm, margin entire, apex acute, outside with simple hairs. *Leaves* simple, opposite, unequal, one much smaller and often caducous. *Non-reduced leaves*: petiole 1–4 mm long, with simple hairs; blade elliptic to obovate, 6.8–13.2 by 2.5–5.2 cm, length/width ratio 2.5–2.7, pergamentaceous, symmetric, drying greenish or brownish, base cordate, symmetric, margin coarsely serrate to subserrate, teeth ending in glands, apex cuspidate to caudate, upper surface with basally a single or two pairs of small extrafloral nectaries on the basal nerves, glabrous, lower surface with simple hairs on the midrib and nerves, many glandular hairs and hair tuft domatia present; nerves 7–9 per side, arching, looped and closed near margin, venation especially raised beneath. *Reduced leaves* subsessile, obcordate to reniform, 4–11 by 4–12 mm, margin laxly dentate, apex rounded to acute, upper surface without extrafloral nectaries, lower surface with glandular hairs; venation distinct on both sides. *Staminate inflorescences* and *flowers* unknown. *Pistillate inflorescences* single, axillary, up to 1.5 cm long, few-flowered, not densely hairy with simple hairs and glandular hairs; bracts broad and short, broken. *Pistillate flowers* c. 1.75 mm in diameter, white; pedicel 1–2 mm long, puberulous; sepals 4 (single badly preserved flower seen), ovate, c. 1.8 by 1.2 mm, revolute, glandular hairs inside and outside, outside laxly puberulous; ovary 3-locular, muricate, with a few short hairs and many glandular hairs; stigmas c. 2.5 mm long, plumose-papillate above. *Fruits* capsular, red (label information), not seen; column 4–5 mm long. *Seeds* not seen.

Distribution — Peninsular Malaysia: Kelantan.

Habitat & Ecology — On dry rocky summit in scrubby vegetation with wet humus and a dense ground cover of mainly orchids and ferns; soil: limestone. At 300–500 m altitude.

Specimens examined:

Chin 1552, Gua Musang; Henderson SF 19543, Gua Panjang.

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