



PERPUSTAKAAN
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MALESIAN SPECIES OF *DASYMASCHALON* (ANNONACEAE)

BY
SIBERKI NURMAWATI



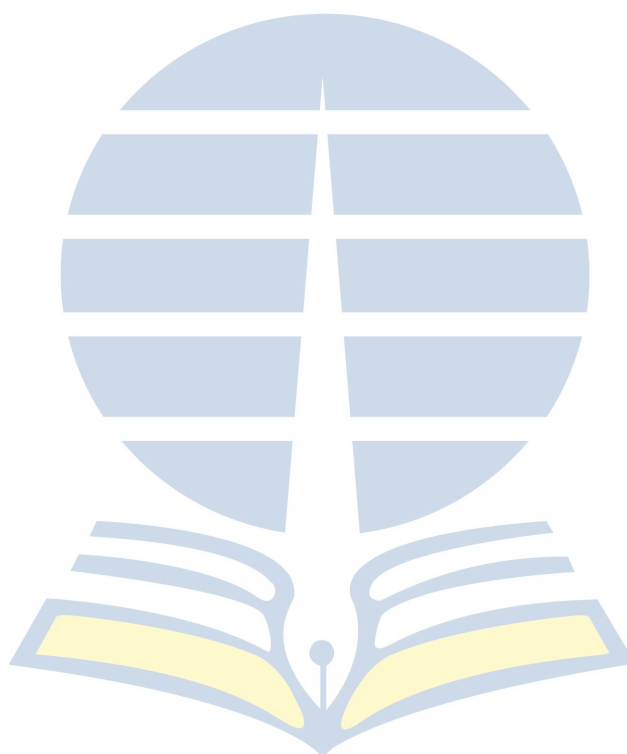
**THE GRADUATE SCHOOL
BOGOR UNIVERSITY OF AGRICULTURE
2003**

ABSTRACT

The study has been based on morphological characters by examining a large number of herbarium specimens from Herbarium Bogoriense, Puslit Biologi-LIPI (BO), Herbarium Andalas University ('ANDA'), Philippine National Herbarium (PNH), Nationaal Herbarium Netherland, Universiteit Leiden branch (L), and also living plants from Bogor Botanical Garden (Kebun Raya Bogor). The present study shows that six species and four varieties of *Dasymaschalon* can be recognized, consisting of three known species 1) *D. blumei* Finet & Gagnep. with one variety i.e var. *wallichii* (Hook.f & Thomson) Ban, 2) *D. clusiflorum* (Merr.) Merr. with three varieties i.e var. *oblongatum* (Merr.) Ban, var. *megalanthum* Merr., and var. *minutiflorum* Nurmawati var. nov., 3) *D. filipes* (Ridl.) Ban, and three newly proposed species *D. hirsutum* Nurmawati, *D. ellipticum* Nurmawati, and *D. borneense* Nurmawati. One species (*D. scandens* Merr.) is excluded because it belongs to the genus *Mitrella*. An analysis of the distribution of these species indicated that *D. clusiflorum* is common species to the Philippines, whereas *D. blumei* are widely distributed in Sumatra, Malay Peninsula, Singapore, Borneo and Java.

A phylogenetic analysis of the genus, with *Desmos cochincinensis* as outgroup, indicated that the species within the genus *Dasymaschalon* is in one group and the outgroup is in the separated group by the apomorf character (character 8 : shape of torus). There are two monophyletic groups, the first group *D. hirsutum* is a sister group of *D. blumei* var. *blumei* and *D. blumei* var. *wallichii* by the apomorf characters (character 1 : petiole long and character 2 : leaves base). The second

group *D. filipes* is a sister group of the *D. ellipticum* and *D. borneense* by the apomorf character 4 (tertiary veins).

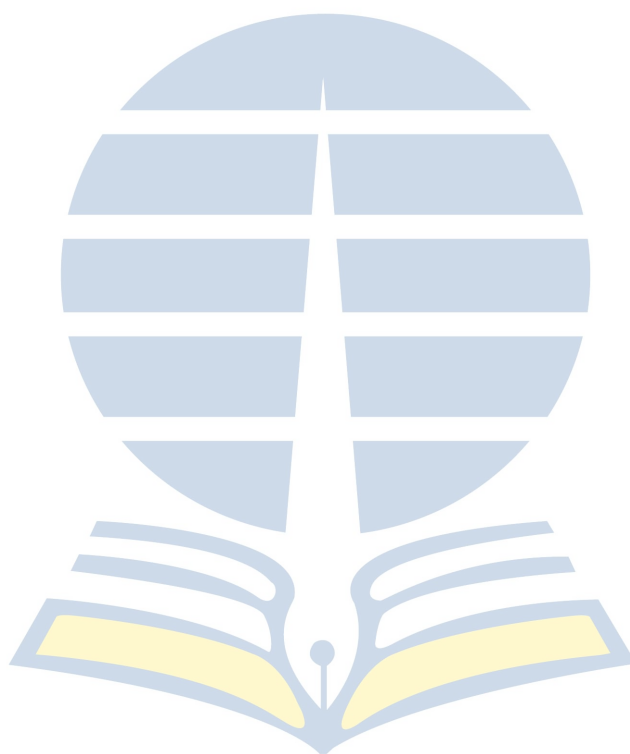


ABSTRAK

Penelitian ini didasarkan pada morfologi spesimen herbarium dari Herbarium Bogoriense, Puslit Biologi-LIPI (BO), Herbarium Universitas Andalas ('ANDA'), Philippina (PNH), Nationaal Herbarium Netherland, Universiteit Leiden branch (L), serta koleksi hidup Kebun Raya Bogor. Hasil penelitian menunjukkan bahwa ada 6 jenis dan 4 varietas *Dasymaschalon*, yang terdiri dari 3 jenis yang telah dikenal 1) *D. blumei* Finet & Gagnep. dengan satu varietas yaitu var. *wallichii* (Hook.f & Thomson) Ban, 2) *D. clusiflorum* (Merr.) Merr. dengan 3 varietas yaitu var. *oblongatum* (Merr.) Ban, var. *megalanthum* Merr., var. *minutiflorum* Nurmawati var. nov., 3) *D. filipes* (Ridl.) Ban, dan tiga jenis baru diusulkan : *D. hirsutum* Nurmawati, *D. ellipticum* Nurmawati, dan *D. borneense* Nurmawati. Satu jenis dikeluarkan (*D. scandens* Merr.) karena termasuk ke dalam genus *Mitrella*. Dari analisis persebaran jenis-jenis tersebut menunjukkan bahwa *D. clusiflorum* paling banyak ditemukan di Philippina, sementara *D. blumei* memiliki wilayah persebaran yang paling luas yaitu di Sumatra, Malay Peninsula, Singapura, Borneo, dan Jawa.

Hasil analisis filogenetik, dengan *Desmos cochinchinensis* sebagai outgroup, menunjukkan bahwa jenis-jenis yang termasuk dalam marga *Dasymaschalon* tergabung dalam satu kelompok dan outgroupnya terpisah oleh karakter apomorf 8 (bentuk dasar bunga). Kelompok jenis dalam marga *Dasymaschalon* terbentuk dua kelompok monophiletik, kelompok pertama *D. hirsutum* merupakan kelompok saudara dari *D. blumei* var. *blumei* dan *D. blumei* var. *wallichii* berdasarkan karakter apomorf 1 (panjang tangkai daun) dan karakter 2 (pangkal daun). Sementara di kelompok monophiletik kedua, *D. filipes* merupakan jenis

saudara dari *D. ellipticum* dan *D. borneense* berdasarkan karakter apomorf 4 (urat daun)



MALESIAN SPECIES OF *DASYMASCHALON* (*ANNONACEAE*)



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At
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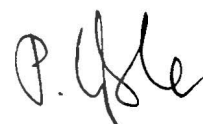
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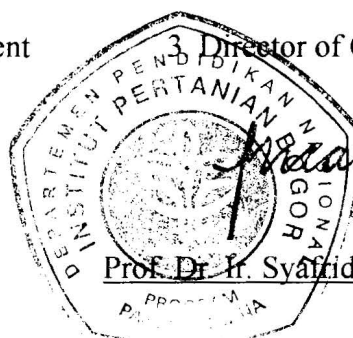
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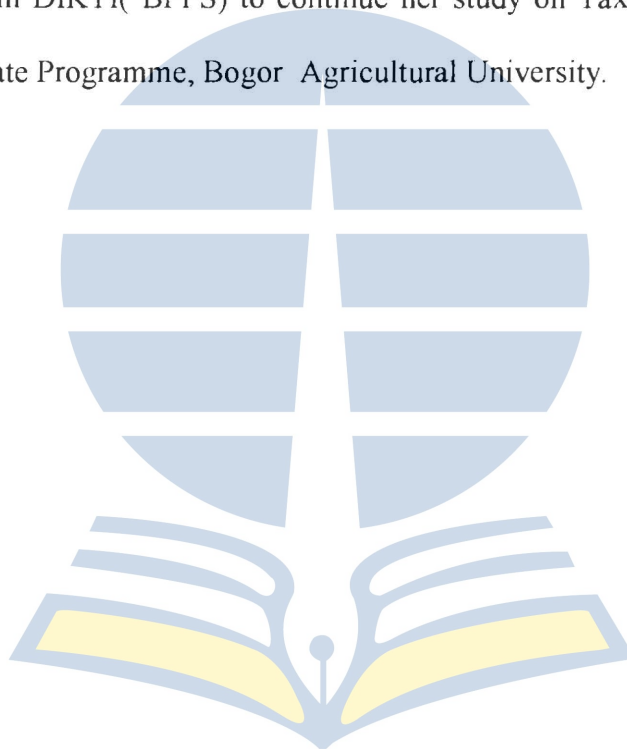
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CURICULUM VITAE

Subekti Nurmawati was born in Boyolali, Central Java on 18 May 1967 as the third daughter of six children from father A. Karim Ibrahim and mother Sudarti. In 1990 she graduated from Biology Department, Sebelas Maret University in Solo.

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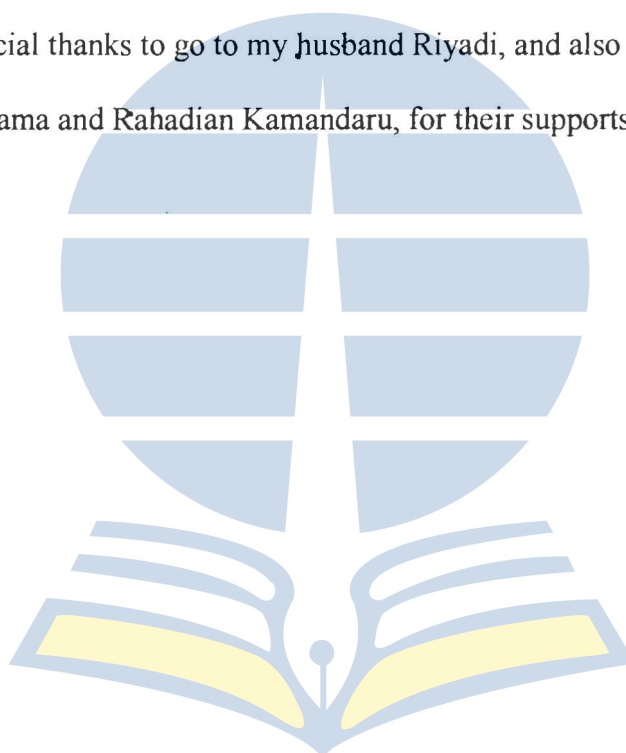
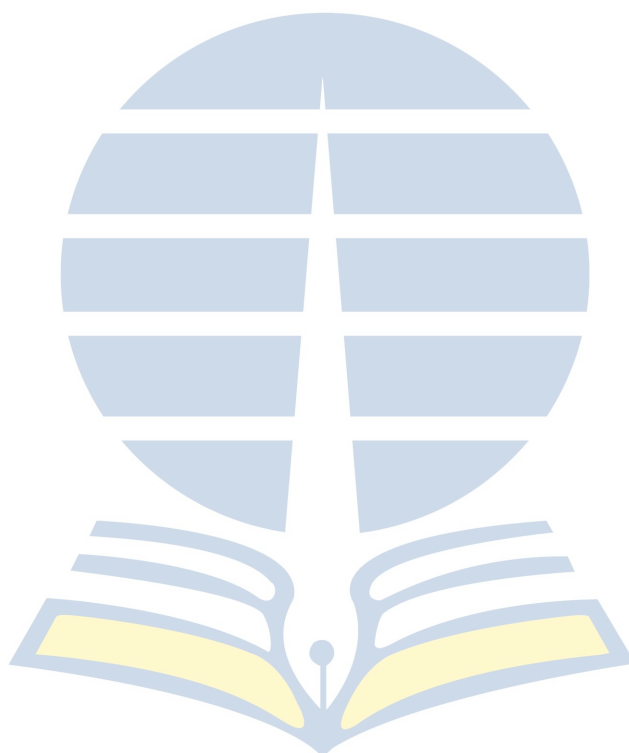


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INTRODUCTION

Dasymaschalon was first established by Hook. f. and Thomson (1855) as a section of *Unona* auct. non L. The name was inspired by *Unona dasymaschala* Blume. King (1893) and Boerlage (1899) retained *Dasymaschalon* as a section of *Unona* until 1901, when Dalla Torre & Harms raised it to generic rank with *Dasymaschalon blumei* as the type species. Finet & Gagnep. (1906), Ast (1938), Hutchinson (1964), Ban (1975), Brummit (1992), van Heusden (1992), and Kessler (1993) followed their view.

According to Finet & Gagnep. (1906), *Dasymaschalon* cannot be treated as a section of *Unona*, because this genus has several peculiar flowers that differ with those of *Unona*. The number of petals are 3, and never 6. The petals are firmly united by their broad margins, never separate, and valvate so that the corolla falls as a whole. These characters are easily recognized and very different from many other genera of *Annonaceae*.

In studying the *Unonas* of the Old World, Safford (1912) concluded that *Unona* auct. non L. was a synonym of *Desmos* Lour., the valid name for the Asiatic genus which Hook.f & Thomson called *Unona*. In this respect he also treated *Dasymaschalon* as a section of *Desmos*. Ridley (1922) and Sinclair (1955), who both studied the flora of the Malay Peninsula, agreed with his view and enumerated two species namely *Desmos dasymaschala* and *Desmos filipes*. *Dasymaschalon* was often included in *Desmos*, mainly based on the similarity of the fruitlets type (moniliform). In other morphological characters, however, several differences between *Dasymaschalon* and *Desmos* can be easily shown

(table 1). These characters strongly support the idea that *Dasymaschalon* has to be recognized as a distinct genus.

Table 1 : The differentiating characters between *Dasymaschalon* and *Desmos*

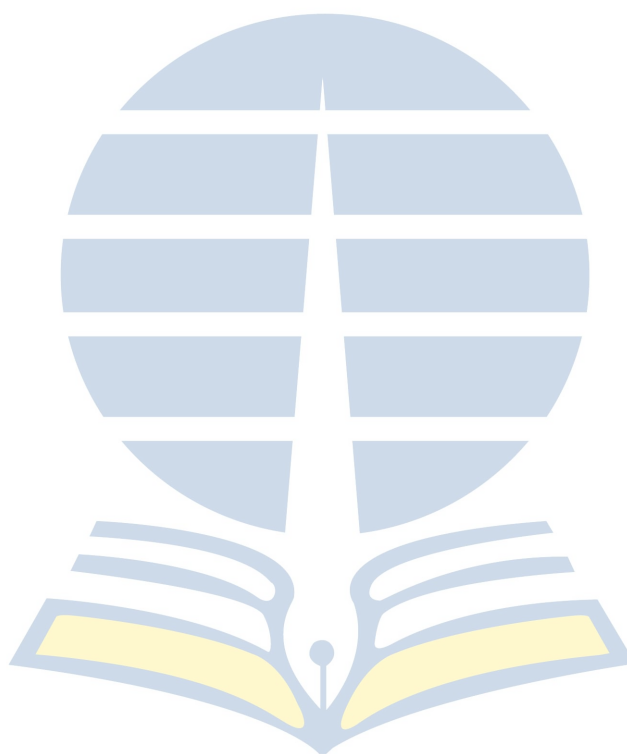
No.	Characters	<i>Dasymaschalon</i>	<i>Desmos</i>
1.	Habitus	Shrub or small tree	Climber (rarely small tree)
2.	Position of inflorescence	Axillary or terminal (rarely supra axillary)	Supra axillary (rarely axillary or terminal)
3.	Numbers of petal whorl	1	2
4.	Numbers of petal	(2)3(4)	6
5.	Aestivation of corolla	Reduplicate valvate	Free
6.	Coherence of petals	Coherent	Spreading
7.	Torus	Convex or shallowly conical	Flat

Merrill (1915) studied the *Annonaceae* in the Philippines and made three new combinations, namely *D. cleistogamum*, *D. coelophloeum*, and *D. clusiflorum*. He described also two new species i.e *D. oblongatum* and *D. scandens*. Ban (1975) was convinced that *D. cleistogamum* and *D. coelophloeum* were synonyms of *D. blumei*, whereas *D. oblongatum* was treated as a variety of *D. clusiflorum*. He recognized 12 species and 5 varieties within the genus distributed in South China, Birma, Indochina, Sumatra, Malay Peninsula, Philippines, Borneo and Java. Three of them (*D. blumei*, *D. clusiflorum* and *D. filipes*) are distributed in the Malesian area.

Based on this short history, it will be clear that the species concept within *Dasymaschalon* is still confusing. Moreover, up to now no generic revision as a whole of the flora of the Malesian region was available. Ridley (1922) and Sinclair (1955) only studied the species of the Malay Peninsula. Ban (1975) revised all *Dasymaschalon* species, but many specimens from the Malesian

area were not studied by him. Therefore, a revision of the genus *Dasymaschalon* in Malesia was urgently needed.

The objectives of this regional revision are to provide a firm generic concept, a complete genus description, and accurate species descriptions. The diversity of the genus can then be mapped, and a practical identification key to the species, can be made. It is expected that the research will improve our understanding of the biodiversity of Malesian *Dasymaschalon*.



MATERIALS AND METHODS

The study was carried out at Herbarium Bogoriense (BO), Bogor, Indonesia, from January to October 2002. It is based on 306 sheets of herbarium specimens (including spirit collections) of BO, the Nationaal Herbarium of the Nederland – Universiteit Leiden branch (L), the Philippine National Herbarium (PNH), and the Andalas University Herbarium ('ANDA').

The material was studied for morphological characters with a 10 x 40 binocular microscope. Morphological characters were also observed on living plants cultivated in the Bogor Botanical Garden. Terminology by Stearn (1988), Harris & Woolf Harris (1994), and Koek-Noorman et.al (1997) were used, whereas the revision methods as described by Leenhouts (1968), Rifai (1976), de Vogel (1987), and Maxted (1992) were used :

- Herbarium material was gathered from four herbaria, including types. The type specimens were also partly downloaded as digital images from websites of various herbaria (L, NY).
- Literature has been gathered from various libraries.
- Characters of each specimen were observed and measured, drawn, and notes were made about distribution, ecology, habitat, vernacular names, uses, and field notes.
- Species descriptions were made, an identification key was constructed and the nomenclatural problems was solved.

RESULT AND DISCUSSION

MORPHOLOGICAL CHARACTERS

The indument, leaf base, secondary veins, flower, and carpodia provide taxonomic evidence which are of fundamental importance for the accurate delimitation and identification of species in *Dasymaschalon*.

The branches of the majority of the species in *Dasymaschalon* are glabrous, but pubescent type of indument is encountered in the young branches of *D. blumei*, although later the indument disappears with age (King 1893). A tomentose type is found in *D. blumei* var. *wallichii*, whereas a hirsute type can be observed in *D. hirsutum*.

During the course of this study correlations between character states of leaf base, petiole length, secondary veins, and type of the monocarps are established. These four characters make quite a constant pattern. When the leaf base is cordate, the petiole length is usually less than 5 mm, the secondary veins are always faint, and followed by the type of monocarps is moniliform. This pattern can be observed in *D. blumei* and *D. hirsutum*. On the other hand, when the leaf base is cuneate to subrounded or rounded, the petiole length is usually more than 7 mm, the secondary veins slender and raised above, and the monocarps is always 1(-2) seeded. This pattern is encountered in *D. filipes*, *D. clusiflorum*, *D. ellipticum* and *D. borneense*.

The flowers mostly are arranged solitary, but in fact the single flower is also arranged in a 2-6 flowered raceme. The petals are commonly arranged in one whorl of 3 (rarely 4), sometimes 2 in *D. filipes* (Ridley 1913) in contrast to most other *Annonaceae* genera where 2 whorls of three petals are common. On top of

the torus there are about 35-50 carpels (Fig 1a) inserted, that are completely surrounded by the c. 100 truncate stamens. The convex or slightly conical torus is covered with more or less dense hairs between the carpels. The stigmas are commonly sessile, only *D. clusiflorum* develops a style. Mostly the outline of the stigma is cylindrical with groove in the inner side (Sinclair 1955), except in *D. ellipticum* where the outline is ellipsoid.

The carpels (ovaries and stigmas) and the stamens (Fig. 2) provide good characters to distinguish the different species. Contrary to Finet and Gagnepain (1906) who reported that all species of *Dasymaschalon* have villous ovaries and glabrous stigma, in this study glabrous ovaries and shortly hispidulous stigmas are also found. The glabrous ovaries are encountered in *D. hirsutum* and *D. borneense*, and shortly hispidulous stigmas can be observed in *D. ellipticum*, *D. hirsutum*, and *D. borneense*. Related to the stamens, Ban (1975) used the shape of the top of the connective prolongation as a character for determining the different species, viz. discoid in *D. clusiflorum* and convex to slightly conical in *D. blumei*. In this study another type is encountered, namely a flat shape one which is found in *D. borneense*. The presence of glandular dots at the top of the stamens also play an important role in the diversification species of the genus. The glandular dots can be found in *D. ellipticum* and *D. borneense*.

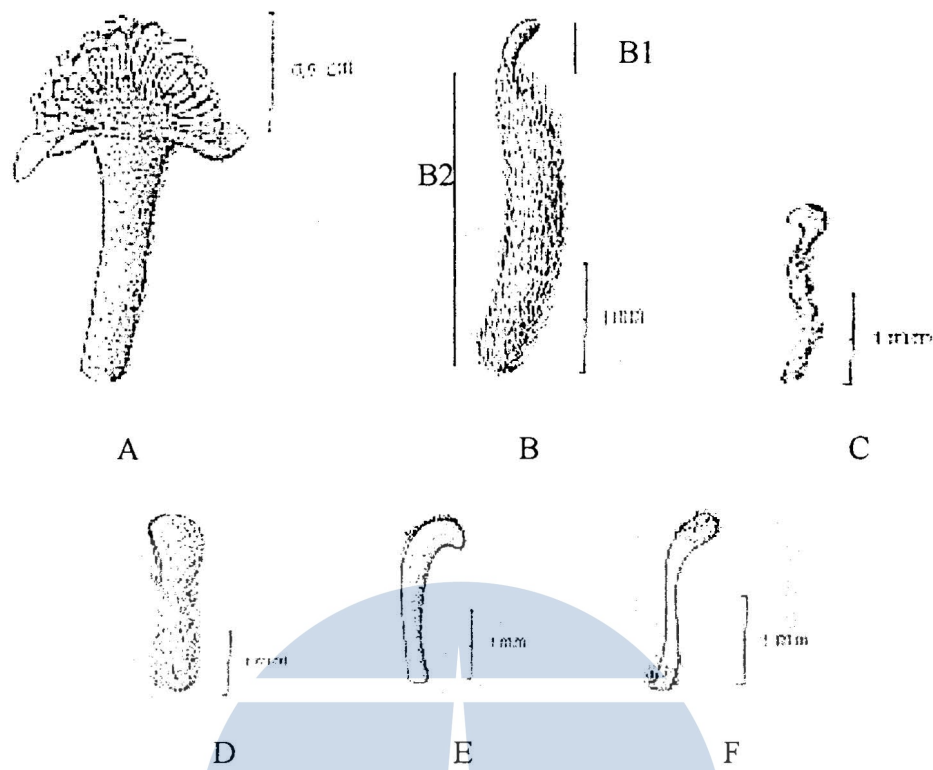


Fig. 1 : Carpel and stamens arrangement, and variation of carpels

A. Carpels and stamens arrangement of *D. hirsutum*, flower with removed petals and stamens, x 7; B-F carpels. B. *D. blumei*, x 20, B1. stigma, B2. ovary; C. *D. clusiflorum*, x 20; D. *D. ellipticum*, x 20; E. *D. hirsutum*, x 20; F. *D. borneense*, x 30 [A & E : *nom. leg.* 74 (L0186176); B: *Rahmat Si Boeea* 9111; C: *Ahern* 2871; D: *Arifin Kalat et.al. BRUN* 15734; F: *Ambriansyah & Arifin* 1687]

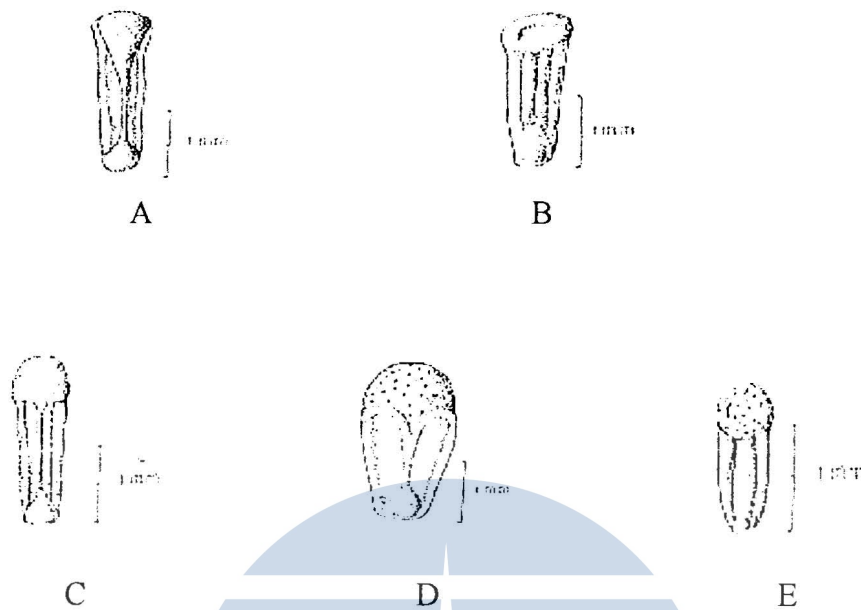


Fig. 2 : Variation of stamens

A. *D. blumei*, x 20; B. *D. clusiflorum*, x 20; C. *D. hirsutum*, x 20; D. *D. ellipticum*, x 20; E. *D. borneense*, x 20. [A: Rahmat Si Boeea 9111; B: Ahern 2871; C: nom. leg. 74 (L0186176); D: Arifin Kalat et.al. BRUN 15734; E: Ambriansyah & Arifin 1687].

PHYLOGENETIC ANALYSIS OF *DASYMASCHALON*

A data matrix of the morphological characters (table 2) was scored according to the species descriptions. When a character state could not be defined it was scored as missing and was noted as “?”

Desmos cochincinensis was chosen as outgroup because of its similarity in vegetative characters (e.g : petiole length, leaf base, and secondary upper veins) and generative characters (e.g : hairy on the ovaries, glabrous stigmas, and type of carpodia). The data matrix was run with HENNIG86 programme with all characters unordered (command code-;) using the command ‘mhennig’ followed by ‘bb*’. Character optimisation was studied with the xx command.

Table 2. Morphological characters and character states used in cladistic analysis of Malesian species of *Dasymaschalon*.

Characters	Character states
0. Branches	0 = glabrous ; 1 = tomentose; 2 = hirsute
1. Petioles length	0 = ≤ 5 mm; 1 = > 7 mm
2. Leaf base	0 = cuneate to sub rounded; 1 = rounded 2 = cordate
3. Secondary upper veins	0 = faint; 1 = slender raised
4. Tertiary veins	0 = scalariform; 1 = reticulate
5. Petals length	0 = ≤ 3 cm; 1 = 4-8 cm; 2 = > 8 cm

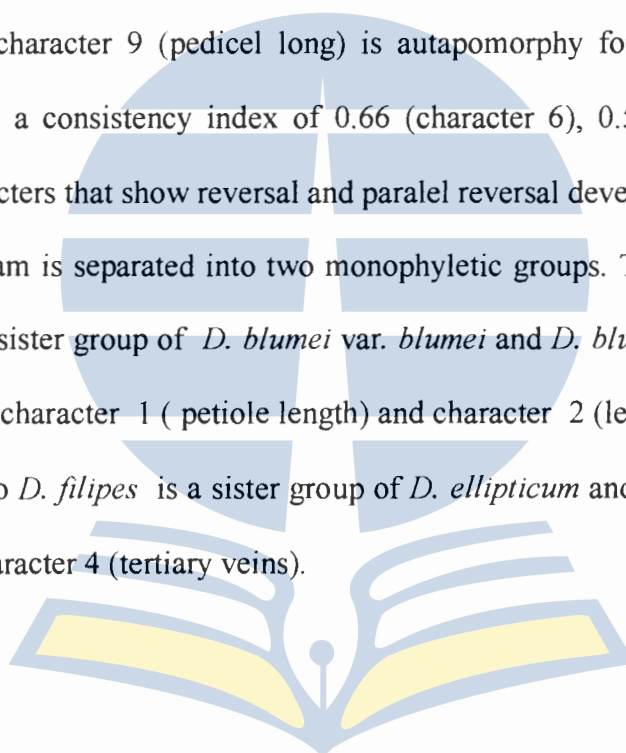
6. Surface of stigma 0 = glabrous; 1 = shortly hispidulous on the side of groove; 2 = shortly hispidulous on all surface
7. Glandular dots on top of the stamens 0 = absent; 1 = present
8. Torus 0 = flat; 1 = convex; 2 = slightly conical
9. Pedicel length 0 = ≤ 2 cm; 1 = 3-15 cm; 2 = > 20 cm
10. Carpida 0 = moniliform; 1 = 1(-2) seeded

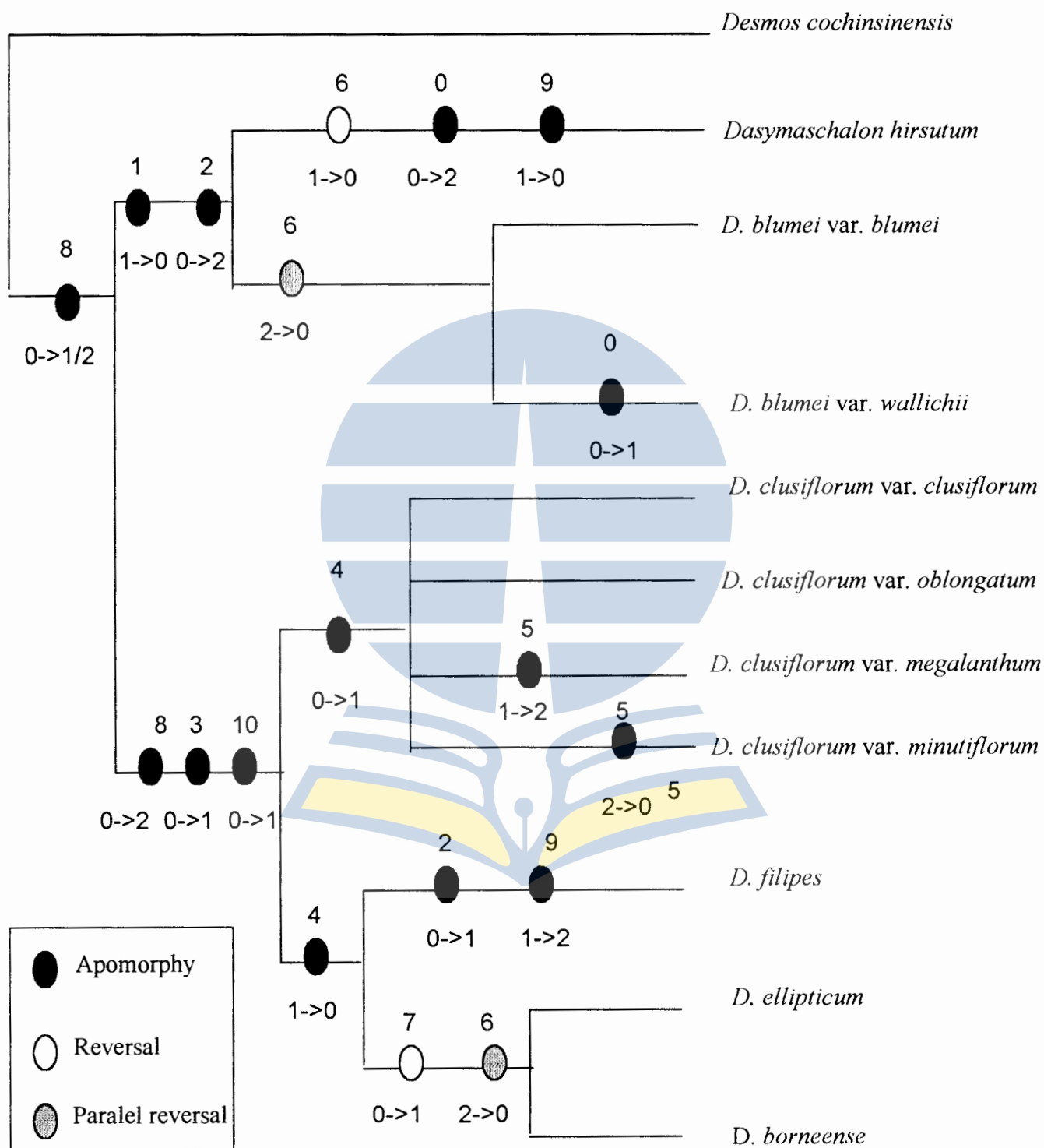
Table 2. Data matrix of the morphological characters used in cladistic analysis of *Dasymaschalon*

OTU	Characters										
	0	1	2	3	4	5	6	7	8	9	10
<i>Desmos cochincinensis</i>	0	1	0	0	0	1	2	0	0	1	0
<i>Dasymaschalon blumei</i> var. <i>blumei</i>	0	0	2	0	0	1	0	0	1	1	0
<i>D. blumei</i> var. <i>wallichii</i>	1	0	2	0	0	1	0	0	1	1	0
<i>D. cluciflorum</i> var. <i>cluciflorum</i>	0	1	0	1	1	1	0	0	2	1	0
<i>D. cluciflorum</i> var. <i>oblongatum</i>	0	1	0	1	1	1	0	0	2	1	?
<i>D. cluciflorum</i> var. <i>megalanthum</i>	0	1	0	1	1	2	?	?	?	1	?
<i>D. cluciflorum</i> var. <i>minutiflorum</i>	0	1	0	1	1	0	0	0	2	1	?
<i>D. filipes</i>	0	1	1	1	0	1	0	?	2	2	1
<i>D. ellipticum</i>	0	1	0	1	0	1	2	1	2	1	1
<i>D. hirsutum</i>	2	0	2	0	0	1	1	0	1	0	0
<i>D. borneense</i>	0	1	0	1	0	1	2	1	2	1	?

species within the genus *Dasymaschalon* is separated from the outgroup by the apomorf character 8 (shape of the torus). Nine characters are placed in the cladogram without the assumption of homoplasious events (consistency index 1.00). They are synapomorphies for : *D. clusiflorum*, *D. filipes*, *D. ellipticum*, and *D. borneense* (characters 3, 8, and 10); *D. hirsutum* and *D. blumei* (characters 1 and 2). Character 0 (branches hirsute), 6 (surface of the stigma shortly hispidulous on the side of groove), and 9 (pedicel length less than 2 cm) are autapomorphy for *D. hirsutum*. Character 0 (branches tomentose) is autapomorphy for *D. blumei* var. *wallichii*, character 9 (pedicel long) is autapomorphy for *D. filipes*. Two characters have a consistency index of 0.66 (character 6), 0.50 (characters 7). These are characters that show reversal and paralel reversal development.

The cladogram is separated into two monophyletic groups. The first group *D. hirsutum* is the sister group of *D. blumei* var. *blumei* and *D. blumei* var. *wallichii* by the apomorf character 1 (petiole length) and character 2 (leaf base). Whereas in the group two *D. filipes* is a sister group of *D. ellipticum* and *D. borneense* by the apomorf character 4 (tertiary veins).



Fig. 7 : Cladogram of *Dasymaschalon*

TAXONOMY

GENERIC DESCRIPTION

***DASYMASCHALON* (HOOK.F & THOMSON) DALLA TORRE & HARMS**

Unona sect. *Dasymaschalon* Hook.f & Thomson. Fl. Ind.1 (1855) 134; Miq., Fl.

Ind. Bat. 16 (1859) 42; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 (1875) 61; King, Ann. Roy. Bot. Gard. (Calcutta) 4 (1893) 58 – *Desmos* sect.

Dasymaschalus (Hook.f & Thomson) Saff., Bull. Torr. Bot. Club. 39 (1912)

507; Ridl., Fl. Malay. Penins. 1 (1922) 46; J. Sinclair, Gard. Bull. Straits

Settlem. 14 : 2 (1955) 262. – *Dasymaschalon* (Hook.f. & Thomson) Dalla

Torre & Harms, Gen. Siphonog. (1901) 174; Finet & Gagnep., Bull. Soc. Bot.

France., 53, Mem. 4 (1906) 141; Hutchinson, The Genera of Flowering Plants

I (1964) 105; Ban, Bot. Zhurn.,60 (2) : (1975) 224; Brummitt, Vascular Plant

Families and Genera (1992) 492; van Heusden, Blumea Suppl. 7 (1992) 67;

Kessler in Kubitzki, The Families and Genera of Vascular Plants 2 (1993) 114

– Type : *Dasymaschalon blumei* Finet & Gagnep. (lectotype)

Shrub or small tree. *Branches* glabrous or hairy. *Leaves* : petiole slender with longitudinal groove, glabrous or hairy; lamina chartaceous, sub coriaceous, or chartaceous to sub coriaceous, oblanceolate oblong, ellipsoid oblong, obovate or lanceolate, base cuneate to sub rounded, rounded or cordate, apex acute, shortly to abruptly acuminate, upper surface glabrous, lower surface pale or glaucous, glabrous or sparsely pubescent; midrib slightly sunken above, glabrous or hairy on both sides; secondary veins faint or slender raised above, distinctly prominent

below, oblique, curved or somewhat straight; lateral veins anastomosing inconspicuous or distinctly prominent; tertiary veins scalariform or reticulate. *Flowers* bisexual, solitary, rarely in a raceme 2-6 flowered, axillary or terminal, seldom supra axillary. *Bracts* 1-3 at various level on the pedicel, triangular, pubescent outside. *Pedicel* thickened at top, glabrous or hairy. *Sepals* 3 connate at base, spreading, broadly ovate or triangular, apex acute, acuminate or mucronate, hairy outside. *Petals* (2)3(4) in one whorl (the inner petals absent) sub coriaceous or coriaceous, (broadly) ovate, linear lanceolate, lanceolate, rhomboid, or triangular, apex acute to acuminate often twisted above, valvate or reduplicate valvate, united by their margin, concave and slightly expanded at base, claw distinct or not, velutinous or puberulent outside. *Stamens* numerous, oblanceolate, fleshy, spirally arranged and tightly packed, connective truncate dilated apex, flat, discoid, convex to slightly conical; glandular dots absent or present. *Carpels* numerous, ovaries narrowly cylindrical, glabrous or villous; stigmas sessile or with stylus, cylindrical groove in the inner side or ellipsoid outline, glabrous or sparsely hispidulous. *Torus* convex or shallowly conical. *Carpidia* pedicelus. *Monocarps* stipitate, 1(-2) seeded or moniliform, each segment globose, ellipsoid, or globose to ellipsoid, granulate or slightly smooth, sparsely pubescent or glabrous; *apiculum* prominent. *Stalks* glabrous or hairy. *Seeds* globose to ellipsoid, smooth, solitary, ruminant endosperm lamellate.

KEY TO THE MALESIAN SPECIES

1. a. Leaves base cordate, secondary veins faint, petioles less than 5 mm,
monocarps moniliform..... 2
- b. Leaves base cuneate to subrounded or rounded, secondary veins slender
raised above, petioles more than 7 mm, monocarps 1(-2) seeded ... 3
2. a. Branches hirsute, secondary veins slightly stright, ovaries glabrous,
stigmas hispidulous on the side of the groove, monocarps glabrous
..... 5. *D. hirsutum*
- b. Branches glabrous or slightly so, secondary veins curved, ovaries villous,
stigmas glabrous, monocarps sparsely pubescent 2. *D. blumei*
3. a. Monocarps ellipsoid, pedicel more than 20 cm 1. *D. filipes*
- b. Monocarps globose, pedicel less than 5 cm 4
4. a. Tertiary veins reticulate, stigmas glabrous, glandular dots at the apex of
the stamen absent 3. *D. clusiflorum*
- b. Tertiary veins scalariform, stigmas hispidulous, glandular dots at the
apex of the stamen present 5
5. a. The top of the stamens flat, ovaries glabrous, lamina chartaceous, lateral
veins anastomosing inconspicuous 6. *D. borneense*
- b. The top of the stamens convex, ovaries villous, lamina sub coriaceous,
lateral veins anastomosing prominent 4. *D. ellipticum*

SPECIES DESCRIPTIONS

1. *Dasymaschalon filipes* (Ridl.) Ban. — Map. 1

Unona filipes Ridl., Journ. Linn. Soc. Bot. 41 (1913) 287 — *Desmos*

filipes (Ridl.) Ridl., Journ. As. Soc. Str. Br. 75 (1917) 6; Ridl., Fl. Malay.

Penins. 1 (1922) 47; J. Sinclair, Gard. Bull. Straits Settlem. 14 (1955) 271.

— *Dasymaschalon filipes* (Ridl.) Ban, Bot. Zhurn. 60 (2) : (1975) 229

Type: *Scortechini 342*, Malaya, Perak (hololecto BO!)

Small trees, c. 5m high. *Branches* glabrous. *Leaves* : petiole 9-17 x 2-3 mm, glabrous; lamina chartaceous to sub coriaceous, ellipsoid oblong or oblanceolate oblong, 16.5-35 x 5-9 cm, base rounded, apex acute to acuminate, lower surface glaucous, glabrous on both sides; midrib glabrous; secondary veins slender raised above, curved, including with the midrib an angle of about 55-60 degree, 14-17 pairs; lateral veins anastomosing inconspicuous; tertiary veins scalariform. *Flowers* unknown. *Pedice* 19-33 cm x c. 1 mm, glabrous (bearing carpidia). *Sepals* broadly ovate, c. 3 x 4 mm, apex acuminate, sparsely pubescent. *Petals* unknown. *Stamens* unknown. *Carpels* unknown. *Torus* shallowly conical. *Monocarps* 20-35, ellipsoid, 10-14 x 7-9 mm, 1(-2) seeded, granulate, sparsely pubescent. *Apiculum* villous. *Stalks* 8-22 x c. 0.5 mm, sparsely pubescent.

DISTRIBUTION : Perak, Kelantan, Pahang.

FIELD NOTE : Fruit brownish- green, redish

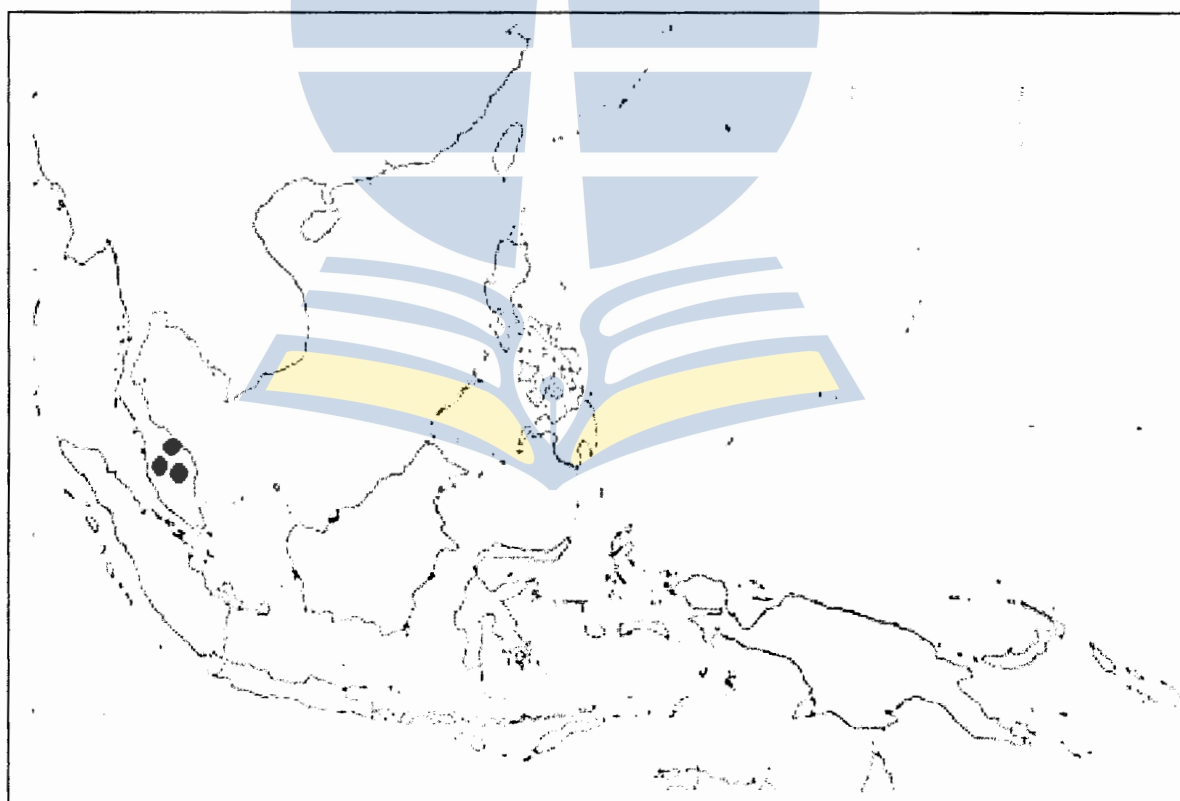
HABITAT & ECOLOGY : This species occurs in Fraser's hill big treeplot, Taiping hill, forest. Alt. 800-1300 m.

VERNACULAR NAMES : Mempisang

NOTES : This species closely resembles *D. longiflorum* (Roxb.) Finet et Gagnep. a native of Assam and Chitagong, India which are preserved in BO (*Jenkins s.n, 17746; King s.n; J.C. Prazer 1890; Simons s.n; nom.leg 17747*). The similarity especially found in its lamina and the numbers of petal, 2 petals in both species. It differs in the characters below :

Characters	<i>D. filipes</i>	<i>D. longiflorum</i>
1. Pedicel length	19-33 cm x c. 1 mm	3.2-12.5 cm x 1.5-2 mm
2. Monocarps	1- seeded (2-seeded)	moniliform
3. Shape of the monocarps	ellipsoid	elongate
4. Petals	much narrower, rather abruptly from a broader base into a long filiform point, c.15 cm x 9 mm*	gradually narrowed and much broader, c. 10 cm x 12 mm

*Ridley (1913)



Map 1 : Distribution of *D. filipes* (Ridl.) Ban

2. **Dasymaschalon blumei** Finet & Gagnep. — Map. 2

Unona dasymaschala Blume, Fl. Jav. Annon.(1830) 55 , t.27; Miq., Fl. Ind. Bat.

(1859) 42; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 (1872) 61; King, Ann. Roy. Bot. Gard. (Calcutta) 4 (1893) 59 Pl.81 — *Desmos dasymaschalus* (Blume) Saff., Bull. Torr. Bot. Club 39 (1912) 507; Backer & Bakh.f, Fl. Java 1 (1963) 106; Ridl., Fl. Malay. Penins.1 (1922) 46; J. Sinclair, Gard. Bull. Strait Settle. 14 (1955) 269.— *Dasymaschalon blumei* Finet & Gagnep., Bull.Soc.Bot. France. 53 Mem. 4 (1906) 143; Ban, Bot. Zhurn. 60 (2):(1975) 227.— Type : *Blume s.n.*, Java (hololectotype BO!; isolectotype L).

Unona coelophloea Scheff., Flora 52 (1869) 300; Boerl., Icon. Bog. 1 (1899)

127, t. 43 — *Dasymaschalon coelopholeum* (Scheff.) Merr., Philip. J. Sci. Bot. 10 (1915) 237. — Type : *Boerlage, s.n.*, Java, cult. In hort. Bot. Bogor, XI, A, 25 (hololecto BO!; isolecto L).

Unona cleistogama Burck ex Boerl., Icon. Bogor 1 (1899) 127 & 201, tab.72

— *Dasymaschalon cleistogamum* (Burck) Merr., Philip. J. Sci. Bot. 10 (1915) 237. — Type : *Teysmann 17910*, Riau, cult. In hort. Bot. Bogor. IV, G, 45 (hololecto BO!).

Shrub or small trees up to 6 m high. *Branches* glabrous or densely tomentose. *Leaves* : petiole 3-5 x 2-3 mm, glabrous or densely tomentose, mostly for the greater part concealed by leaf base; lamina chartaceous to sub coriaceous, oblanceolate oblong, 9-31 x 4-10 cm, base cordate, apex acute, shortly to abruptly acuminate, lower surface pale or glaucous, glabrous or sparsely pubescent and purple tinged below; midrib glabrous or densely tomentose on

both side; secondary veins faint, curved, 10-14 pairs, including with the midrib an angle of about 35-55 degree, glabrous or densely tomentose; lateral veins anastomosing inconspicuous; tertiary veins scalariform. *Flowers* solitary, rarely raceme 2-4 flowered, axillary or terminal. *Pedicel* 3.4-15 cm x 1.5-2 mm, glabrous, sparsely pubescent or densely tomentose. *Sepals* triangular, 4-5 x c. 4 mm, apex acuminate, sparsely pubescent or densely tomentose. *Petals* 3 (4), sub coriaceous or coriaceous, lanceolate, 3.5-7 x 1.5-2.4 cm, thick 0.5-1 mm, apex acuminate, reduplicate valvate, claw not distinct, velutinous or puberulent. *Stamens* c. 4 x c. 1 mm, apex convex, glandular dots absent. *Carpels* 4-6 x c.1 mm; ovaries densely villous; stigmas sessile, cylindrical groove in the inner side, glabrous. *Torus convex. Monocarps* 7-30, moniliform 2-7 seeded, each segment globose to ellipsoid, 7-9 x 5-8 mm, granulate, sparsely or densely pubescent. *Stalks* 4-15 x 1-2 mm, glabrous or sparsely pubescent.

DISTRIBUTION : Sumatra, Malay Peninsula, Singapore, Java, Borneo.

VERNACULAR NAMES : Jari ayam, Kenanga paya, Chenang hutan (Kenanga hutan), Larak api, Pagar anak, Jari ayam, Chin ching, Banitan rampai (Jambi).

USES : This species is used in traditional medicine in the same way as *Desmos*, e.g. to treat dysentery, vertigo, fever, and after childbirth.

HABITAT & ECOLOGY : This species occurs in undisturbed open primary forest with little undergrowth, flat top of huge limestone outcrop and bare rock covered with roots and some humus, rain forest, fresh water swamp forest, along road at primary hill forest, secondary forest reserve and river area. Alt. 30-700 m.

NOTES : As the lectotype of *Unona dasymaschala* a specimen from Blume's collections, collected from Java that are preserved in BO and L is herewith designated.

D. blumei is the most common species. It varies especially in the size of leaves and pedicel. The small leaves commonly found in the specimens which formerly were cited as *D. cleistogamum* and *D. coelophoeum*, whereas the long leaves usually discovered in the collections from Java. Long pedicel (more than 10 cm) are observed in several collections from Sumatera (*Tamin & Arbain 7008, Alvi 186, Rahmat Si Toroes 5393*) and Johore (*T. & P. 1120*).

KEY TO THE VARIETIES OF *D. BLUMEI*

1. a. Branches, petiole and midrib glabrous, leaves pale glabrous below, petals coriaceous, puberulent var. *blumei*
- b. Branches, petiole, and midrib tomentose, leaves glaucous sparsely pubescent and purple tinged below, petals sub coriaceous, velutinous var. *wallichii*

a. var. *blumei*

Branches glabrous. *Leaves* : petiole glabrous; lamina 9-31 x 4-10 cm, apex acute, shortly to abruptly acuminate, lower surface pale, glabrous; midrib glabrous on both side; secondary veins including with the midrib an angle of about 35-55 degree, glabrous. *Flowers* solitary, rarely raceme 2-4 flowered. *Pedicel* 3.4-15 cm x 1.5-2 mm, glabrous to sparsely pubescent. *Sepals* sparsely pubescent outside. *Petals* 3 (4), coriaceous, 3-7 x 1.2-2.4 cm, thick 1 mm, puberulent. *Monocarps* 7-20, 7-9 x 5-8 mm, sparsely pubescent. *Stalks* 4-15 x 1-2 mm, glabrous.

DISTRIBUTION : Sumatra, Malay Peninsula, Java, Borneo.

FIELD NOTES : Bark dark brown with rows of pale lenticels. Flower buds pinkish green, creamy. Petal reddish brown at the top, yellowish green at the base, yellow, orange. Carpida immature green, mature red.

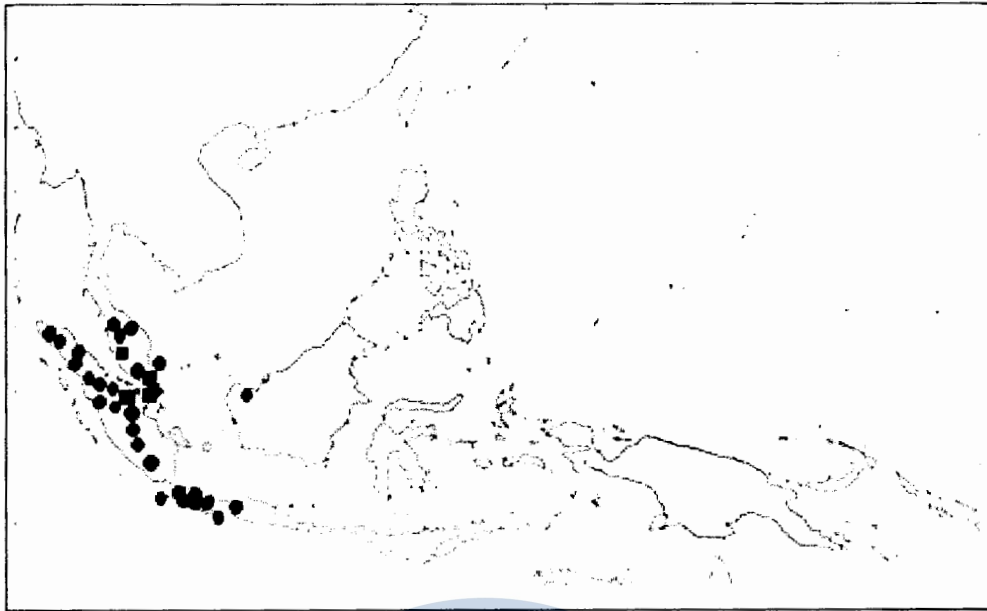
b. var. *wallichii* (Hook.f. & Thomson) Ban

Unona dasymaschala Blume var. *wallichii* Hook.f. & Thomson. Fl. Ind. 1 (1855) 135 and in Fl.Br. India. 1 (1872) 62; King, in Ann. Roy. Bot. Gard. (Calcutta) 4 (1893) 60. — *Dasymaschalon blumei* Finet & Gagnep. var. *wallichii* (Hook.f. & Thomson) Ban, Bot. Zhurn., 60 (2): (1975) 228.— Type : *Wall. Cat. 6421* a quoted as *6241* in Fl. Br. India. (holo K, n.v)

Branches densely tomentose. *Leaves* : petiole densely tomentose; lamina 12-30 x 4.5-9 cm, lower surface glaucous, sparsely pubescent and purple tinged below; midrib densely tomentose on both side; secondary veins including with the midrib an angle of about 45-50 degree, densely tomentose; *Flowers* solitary. *Pedicel* 5.4-10 cm x 1-2 mm, glabrous, densely tomentose. *Sepals* densely tomentose outside. *Petals* 3, sub coriaceous, 2.8-5.5 x 1-1.7 cm, thick 0.5 mm, velutinous. *Monocarps* 15-30, 7-8 x 5-5.5 mm, densely pubescent. *Stalks* 4-7 x 1-2 mm, sparsely pubescent.

DISTRIBUTION : Sumatra, Malay Peninsula, Singapore.

FIELD NOTES : Fruit light green going red, juicy



Map 2. : Distribution of *D. blumei* Finet & Gagnep.

(●) var. *blumei* (■) var. *wallichii* (Hook.f. & Thomson) Ban

3. *Dasymaschalon clusiflorum* (Merr.) Merr. — Map.3

Unona clusiflora Merr., Govt. Lab. Publ. Philip. 35 (1906) 13. — *Polyalthia clusiflora* (Merr.) Robins, Bull. Torr. Bot. Club. 35 (1908) 68. — *Dasymaschalon clusiflorum* (Merr.) Merr., Philip. J. Sc. Bot. 10 (1915) 237; Ban, Bot. Zhurn. 60 (2):(1975) 231. — Type : *Merrill 2521*, Phillipine, Luzon, Bataan, Lamao river (holo US! in a digital image).

Small trees up to 10 m high. *Branches* glabrous. *Leaves* : petiole 7-15 x 1-2 mm, glabrous; lamina chartaceous to sub coriaceous, ellipsoid oblong, narrowed ellipsoid, broadly ellipsoid or lanceolate, 5.5-23.7 x 1.3-9 cm, base cuneate to subrounded, apex acute or shortly acuminate, lower surface pale, glabrous; midrib glabrous on both sides; secondary veins slender raised above, curved, 6-12 pairs, including with the midrib an angle of about 35–55 degree, glabrous; lateral veins

anastomosing inconspicuous; tertiary veins reticulate. *Flowers* solitary, rarely raceme 2-6 flowered, axillary or terminal. *Pedice*l 1.2-4.2 cm x 1-2 mm, glabrous. *Sepals* broadly ovate, 2-4 x 2-5 mm, apex acute or acuminate, sparsely pubescent. *Petals* 3, coriaceous, (broadly) ovate, lanceolate, triangular, or rhomboid, claw distinct or not, 1.2-11 x 1 – 2.4 cm, thick 0.5-3 mm, apex acute or shortly to abruptly acuminate, valvate or reduplicate valvate, puberulent. *Stamens* 2-4 mm x c. 0.5-1 mm, apex discoid, glandular dots absent. *Carpels* 1.5-2 x c. 0.5 mm; ovaries densely villous; stigmas with stylus, cylindrical groove in the inner side, glabrous. *Torus* shallowly conical. *Monocarps* 20-50, globose, 7-17 x 5-8 mm, 1(-2) seeded, granulate, glabrous to sparsely pubescent; *Stalks* 8-21 x 1-2 mm, glabrous to sparsely pubescent.

DISTRIBUTION : Philippina: Luzon, Mindanao, Babuyanes, Mindoro, Cebu, Samar; Indonesia : Celebes and Borneo.

FIELD NOTES : Bark grey yellowish grey, inner bark brown, sapwood yellowish. Perianth yellow green, when young initially covered with yellowish brown tomentum which is lost at maturity, mature flower yellow; fruit greenish black when mature.

HABITAT & ECOLOGY: This species occurs in mixed dipterocarp forest, slopes of hill, on sandy clay soil, secondary forest- along the trail, on hills near the sea, in thickets about limestone cliffs and boulders, about 50-1300 m altitude.

VERNACULAR NAMES : buyanus (Cebu Bisaya), kalabuyo (Tagalog), kalimatas (Tagalog), lanutan (Tagalog), Lanutan Puti (Tagalog), Malaatis (Tagalog), malamarobo (S.L. Bis), malasagiat (Iloko), panagit (Cebu Bisaya), sagapan (Baguio.), sakot (Iloko).

USES : In the Philippines, the stems are used as firewood and small construction. The leaves are used externally to treat wounds, whereas a decoction of the roots or leaves is reputedly a good diuretic, stomach ache, and food poisoning.

NOTES : This species is common in Philippine. It is represented by over 60 specimens. The material presents considerable variation, especially in the length of the flowers.

KEY TO THE VARIETIES

1. a. Petals claw not distinct, between 50-900m altitude 2
 - b. Petals claw distinct, c.1300 m altitude var. *oblongatum*
2. a. Lamina lanceolate, petal length c. 11 cm var. *megalanthum*
 - b. Lamina ellipsoid, petal length less than 7 cm 3
3. a. Lamina ellipsoid oblong, petals ovate to lanceolate, reduplicate valvate
 - c. 0.5 -1 mm in thickness var. *clusiflorum*
 - b. Lamina broadly ellipsoid, petals triangular, valvate, c. 3 mm in thickness var. *minutiflorum*

a. var. *clusiflorum*

Leaves : petiole 6-15 x 1-2 mm; lamina ellipsoid oblong, 5.5-23.7 x 4-9 cm, apex acute or shortly acuminate; secondary veins 8-12 pairs, including with the midrib an angle of about 50-60 degree. *Flowers* solitary, rarely raceme 2-6 flowered. *Pedicel* 1.2-3.8 cm x 1-2 mm. *Sepals* 2-4 x 3.5-5 mm, apex acute, sparsely pubescent outside. *Petals* coriaceous, (broadly) ovate to lanceolate,

1.2-11 x 1 – 2.4 cm, claw not distinct, thick 0.5-1 mm, apex acute or shortly to abruptly acuminate, reduplicate valvate.

DISTRIBUTION : Philippina: Luzon, Mindanao, Babuyan, Mindoro, Cebu, Samar; Indonesia : Celebes and Borneo.

HABITAT & ECOLOGY: In mixed dipterocarp forest, slopes of hill, on sandy clay soil, secondary forest- along the trail.

NOTE : One collection from Celebes, Bolaang Mongondow, Dumoga Bone National Park (*de Vogel & Vermeulen 6553*) differ in several ways from those from Philippine and Borneo (e.g the thicker leaves and the more abundant carpidia).

b. var. *oblongatum* (Merr.) Ban

Dasymaschalon oblongatum Merr., Philipp. J. Sci. 10 (1915) 237. — *Dasymaschalon clusiflorum* (Merr.) Merr. var. *oblongatum* (Merr.) Ban, Bot. Zhurn. 60 (2) : (1975) 231.— Type : *Merril 9703* (holo destr.; iso BO!, US in a digital image) Philippine : Luzon subprov. Benquet Baguio, May 1914.

Leaves : petiole 6-8 x 1-1.5 mm; lamina ellipsoid oblong, 5.7-12.5 x 1.3-3 cm, apex acuminate; secondary veins 6-9 pairs, including with the midrib an angle of about 35-40 degree. *Flowers* solitary. *Pedicel* c. 1.3 cm x 1 mm. *Sepals* c. 2 x 4 mm, apex acute, sparsely pubescent out side. *Petals* sub coriaceous, rhomboid, 4.5-7 x 1.8-2 cm, thick 0.5 mm, claw distinct, apex abruptly acuminate, reduplicate valvate.

DISTRIBUTION : Philippine : Luzon subprov. Benquet Baguio.

HABITAT & ECOLOGY : In thickets about limestone cliffs and boulders about 1300 m altitude.

c. var. *megalanthum* Merr.

Dasymaschalon clusiflorum (Merr.) Merr. var. *megalanthum* Merr., Philipp. J. Sc. 10 (1915) 237 .— Type : *Curran 10686* (holo destr.; iso L!, NY! in digital image), Philippine : Luzon Prov. Camarines, Caramoan, Peninsula, June 1908.

Leaves : petiole 6-8 x 1-2 mm; lamina lanceolate, 8-18.2 x 4.2-5.2 cm, apex acute, secondary veins 7-10 pairs, including with the midrib an angle of about 50-55 degree. *Flowers* solitary. *Pedice*l c.3 cm x 1.5 mm. *Sepals* c.2 x 3 mm, apex acuminate. *Petals* coriaceous, lanceolate, 11 cm x 1-1.7 mm, thick c.1 mm, claw not distinct, apex shortly acuminate, reduplicate valvate.

DISTRIBUTION : Philippine: Luzon Prov. Camarines, Caramoan, Peninsula.

HABITAT & ECOLOGY : On hills near the sea.

d. var. *minutiflorum* var. nov

Type : *J. Ampuria s.n.*, *SAN 32614* (L0181849), Mamahat camp., K.F. Loang's logging area, 18 November 1962 (holo L).

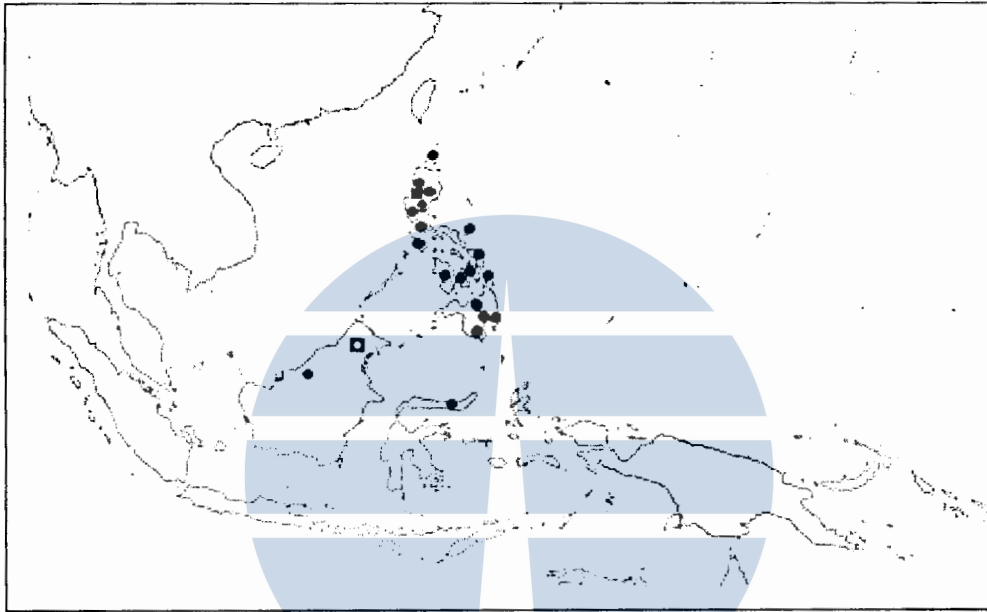
Foliis latus ellipticus, 8-15 cm longis, 3-7 cm latis. Petalis triangularis, 1-2 cm longis, c. 1.5 mm latis, c. 3 mm crasi, valvatis.

Leaves : petiole 7-8 x 1-2 mm; lamina broadly ellipsoid 8-15 x 3-7 cm, apex acuminate; secondary veins 7-12 pairs, including with the midrib an angle of

about 50-55 degree. *Flowers* solitary. *Pedice*l 1-2 x c. 1.5 mm. *Sepals* c.2 x 3 mm, apex acuminate. *Petals* coriaceous, triangular 1.2-2.2 x 1-1,3 cm, thick c. 3 mm, claw not distinct, apex abruptly acuminate, valvate.

DISTRIBUTION : Sandakan

HABITAT & ECOLOGY : Primary forest brown soil, alt. 900 m



Map 3 : Distribution of *D. clusiflorum* (Merr.) Merr.

- (●) var. *clusiflorum* (■) var. *oblongatum* (Merr.) Ban
 (▲) var. *megalanthum* Merr. (□) var. *minutiflorum* Nurmawati var. nov.

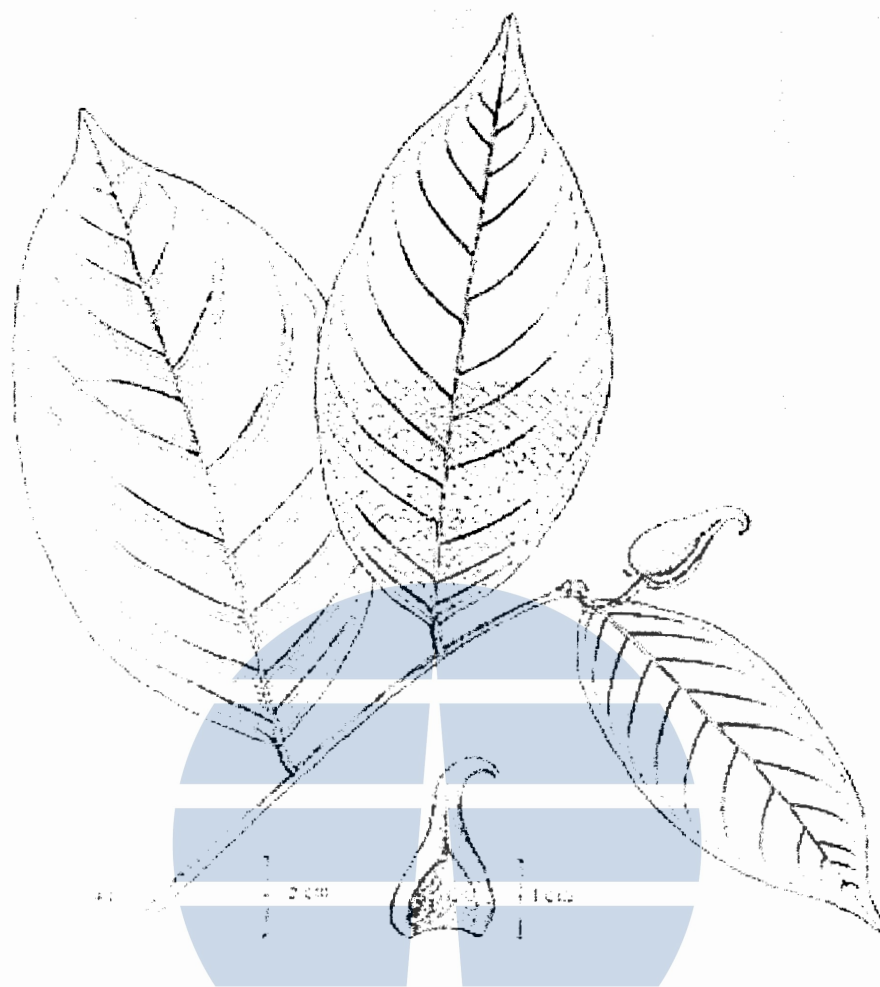


Fig. 3 : *D. clusiflorum* (Merr.) Merr. var. *minutiflorum* Nurmawati var. nov.

(*J. Ampuria s.n.*, SAN 32614)

4. *Dasymaschalon ellipticum* Nurmawati sp.nov.— Map.4, Fig. 4

Type : *Arifin Kalat et.al*, BRUN 15734, Brunei, Tutong, Tasek Merimbun, Mukim Rambai, 26 June 1993 (holo L)

Arbor parva c. 2.5 m altis. Ramuli glabris. Petioli 10-17 mm longi, 2-3 mm crasi. Foliis leviter coriaceis, oblongo oblanceolatis, 17.5-33.6 cm longis, 4-9.6 cm latis, basi cuneatis vel leviter rotundatis, apice acutis vel acuminatis, glabris. Costam glabris, superioris tenuibus elevatis, leviter perspicuis, scalariformis,

anastomosing prominentibus. Flores solitarius vel racemis 2-4 floribus, axillares vel extra axillares, pedicellis glabris, 1.5-2 cm longis, c. 1 mm crasi. Sepalis ovatis, apice mucronatus, extus rigide pubescentibus. Petalis linearis lanceolatis, 3.3-7 cm longis, 0.8-1.2 cm altis, apice acutus. Ovary villosus, stigmata ellipticus, rigide hispidulous.

Small trees up to 5 m. *Branches* glabrous. *Leaves* : petiole 10-17 x 2-3 mm, glabrous; lamina sub coriaceous, oblanceolate oblong, 17.5 – 33.6 x 4-9.6 cm, base cuneate to sub rounded, apex acute or acuminate, lower surface glaucous, glabrous; midrib glabrous on both sides; secondary veins slender raised above, glabrous, curved, 13-19 pairs, including with the midrib an angle of about 50-60 degree; lateral veins anastomosing distinctly prominent; tertiary veins scalariform. *Flowers* solitary or raceme 3-5 flowered, axillary (supra axillary). *Pedicel* 1.5-2 cm x c. 1 mm glabrous. *Sepals* broadly ovate c.2 x c.3-4 mm, apex mucronate, sparsely pubescent. *Petals* 3, coriaceous, linear lanceolate, 3.3-7 cm x 0.8-1.2 mm, thick c. 1 mm, apex acute, reduplicate valvate, claw not distinct, velutinous. *Stamens* 2-3 x c. 1 mm, apex convex, glandular dots present. *Carpels* c.2 x c. 0.5 mm; ovaries densely villous; stigmas sessile, ellipsoid, sparsely hispidulous. *Torus* shallowly conical. *Monocarps* 20-30, sub globose to ellipsoid, 7.5–10 x 6-7.5 mm, 1(-2) seeded, slightly smooth, glabrous. *Stalks* 8-14 x c.1 mm, sparsely pubescent.

DISTRIBUTION : Brunei, Tutong, Rambai, Tasek Marimbun, Pulau Silad, Belaid, Bukit Toraja, Sarawak, Borneo.

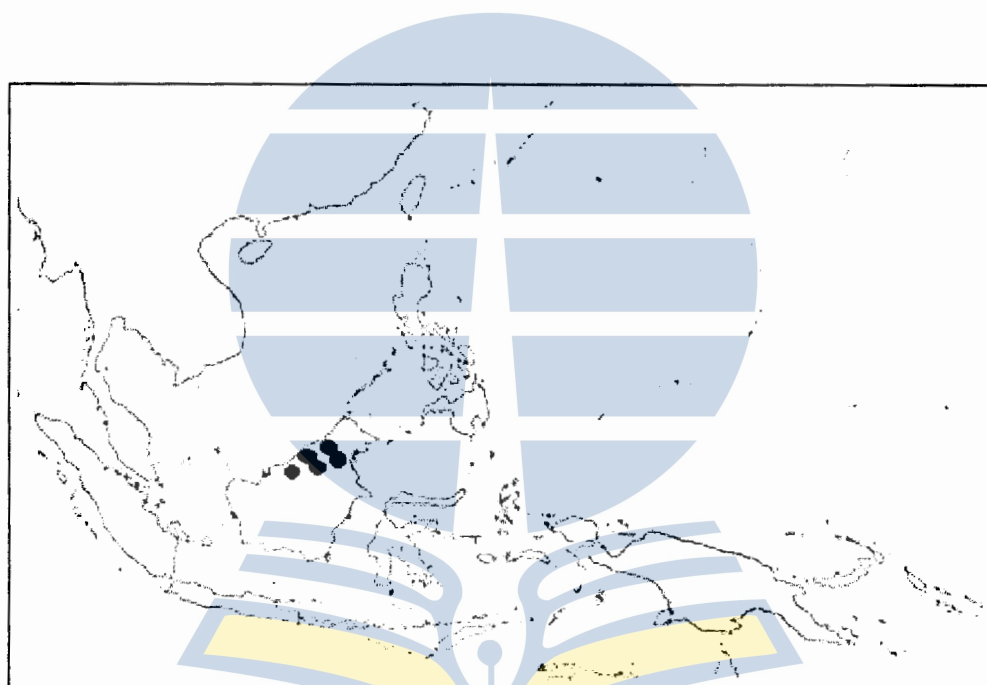
FIELD NOTES : Sapwood yellowish, black greys, inner bark green. Fl.

Yellow, pale red yellowish orange, fruit grey green to creamy yellow

HABITAT & ECOLOGY : This species occurs in fresh water, swamp forest near the river dipterocarp on slope.

VERNACULAR NAME : Mempisang

NOTE : This species related to *D. clusiflorum* based on the same type of the monocarp and the petiole length. It differs in its much thicker leaves and the presence of the indument on the surface of the ovaries and stigmas.



Map 4 : Distribution of *D. ellipticum* Nurmawati sp.nov.



Fig. 4 : *D. ellipticum* Nurmawati sp. nov

A. Flower, x 1; B. Carpel, x 25; C. Stamen, x 20; D. Habit with carpidia, x 0,5;
 E. Carpels and stamens arrangement with remove stamens, x 7 (A-E : Arifin
Kalat et.al, BRUN 15734)

5. ***Dasymaschalon hirsutum*** Nurmawati sp.nov. –Map 5, Fig. 5

Type : *Eric Gardette E.G. 2306*, Malaysia, Negeri sembilan, Jelebu District,
 Pasoh, 4 October 1996 (holo L).

Shrubby vel arbor parva c. 2,5 m. Ramuli hirsutis. Petioli 3-5 mm longi, 2-3 mm crasi. Foliis chartaceis, obovatis vel oblongo oblanceolatis, 12.5-32 cm longis, 5.5-11 cm latis, basi cordatis, apice acutis vel acuminatis, sparsim pubescentibus. Costam hirsutis, superioris tenuis, scalariformis, anastomosing tenuis. Flores solitarius, axillares vel terminalis. Pedicellis hirsutis, 1-1.5 cm longis, c. 1.5 mm crasi. Sepalis ovatis, apice mucronatus, extus pubescentibus. Petalis lanceolatis, 4-8 cm longis, 0.5-1.2 cm altis, apice acuminatis. Ovary glabris, stigmata cylindricus, rigide hispidulous.

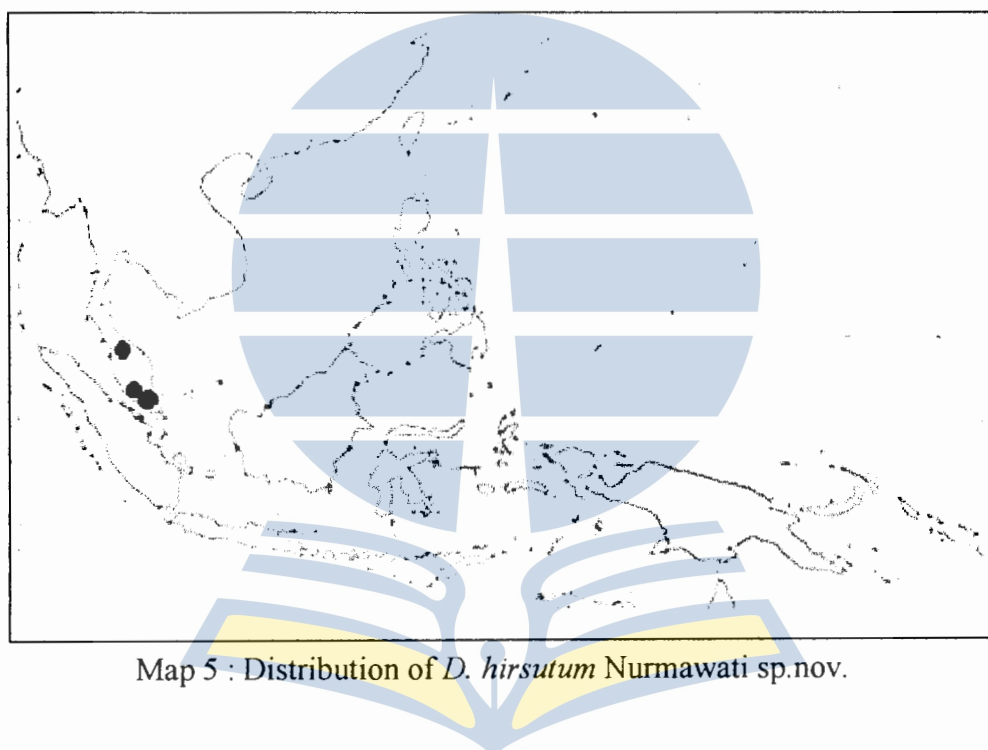
Shrub or small trees up to 2.5 m. *Branches* hirsute. *Leaves* : petiole 3-5 x 2-3 mm, hirsute; lamina chartaceous, obovate or oblanceolate oblong, 12.5-32 x 5.5-11 cm, base cordate, apex acute or acuminate, lower surface sparsely pubescent; midrib hirsute on both sides; secondary veins faint, somewhat straight, 10-17 pairs, including with the midrib an angle of about 40-50 degree, hirsute; lateral veins anastomosing inconspicuous; tertiary veins scalariform. *Flowers* solitary, axillary or terminal. *Pedicel* 0.5-1.5 m x c. 1.5 mm, hirsute. *Sepals* broadly ovate c.3 x c.5 mm, apex mucronate, pubescent. *Petals* 3, sub coriaceous, lanceolate, 4-8 cm x 0.5-1.2 mm, thick 0.5 mm, apex acuminate, reduplicate valvate, claw not distinct, velutinous. *Stamens* 1.5-2 x c. 1 mm, apex slightly conical, glandular dots absent. *Carpels* c.2-3 x c. 0.5 mm; ovaries glabrous, stigmas sessile, cylindrical groove in the inner side, sparsely hispidulous on the side of the grooved. *Torus* convex. *Monocarps* 10-20, moniliform 2-3 seeded, each segment globose to ellipsoid, 8 – 10 x 5-6.5 mm, slightly smooth, glabrous. *Stalks* 6-9 x c.1 mm, hirsute.

DISTRIBUTION : Perak, Ulu Kelantan -Bertam, Negeri Sembilan, Johore.

FIELD NOTES : Fruits yellowish green.

HABITAT & ECOLOGY : In lowland dipterocarp primary rain forest.

NOTE : This species closely resemble *D. macrocalyx* Finet & Gagnep. Bull. Soc. Bot. France. 53 Mem. 4 (1906) 144; Merr. in Lingnan Sc. Journ 6 (1928) 326, native of Hainan, Saigon. Two specimens of this species preserved in BO (Poilane 19666, Lei, C.I 30) show that they have much longer calyx (6-15 mm).



Map 5 : Distribution of *D. hirsutum* Nurmawati sp.nov.

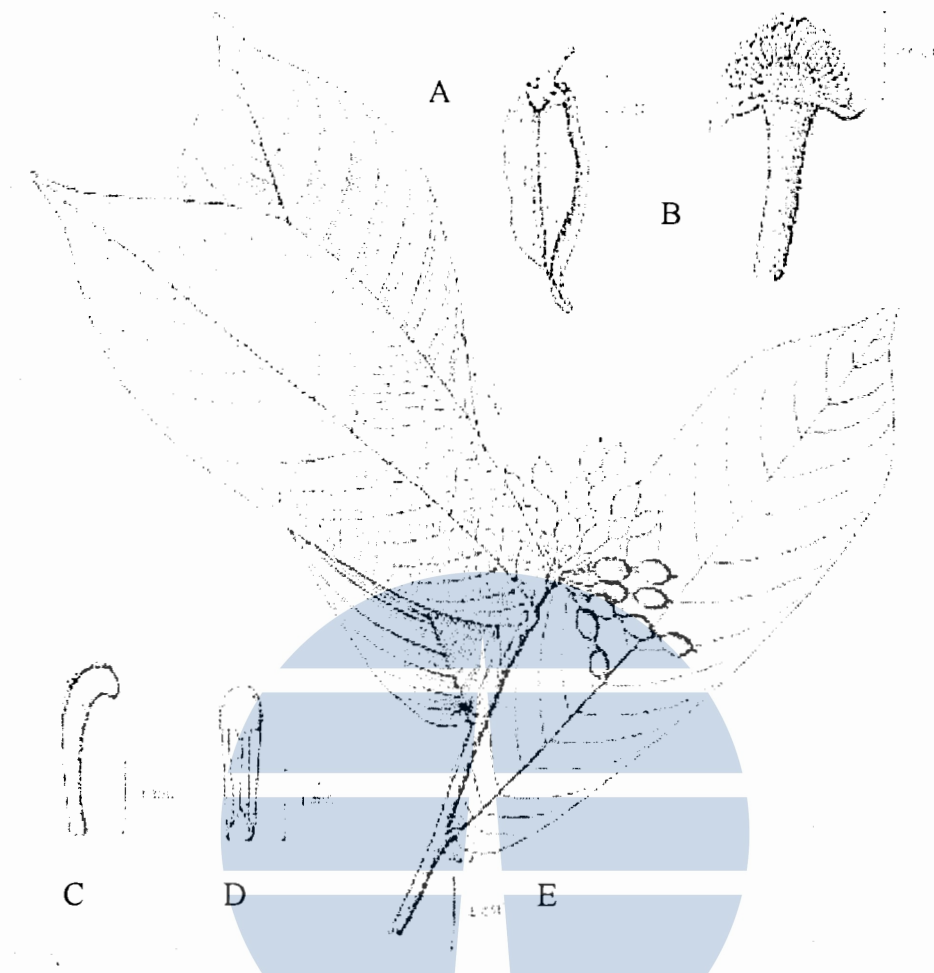


Fig. 5 : *D. hirsutum* Nurmawati sp. nov.

A. Flower, x 1; B. Carpels and stamens arrangement, x 7; C. Carpel, x 20:

D. Stamen, x 20; E. Habit and carpidia, x 0,5 [A nom.leg 74, B-E Eric Gardette 2306]

6. ***Dasymaschalon borneense*** Nurmawati sp. nov. – Map 6, Fig.6

Type : *Ambriansyah & Arifin 1687*, East Kalimantan, KPC Area, East
Bengalon, Kuari area km. 21, 07 April 1996.

Arbor parva c. 2 m altis. Ramuli glabris. Petioli 12-18 mm longi, 1.5-2.5 mm crasi. Foliis chartaceis, oblongo oblanceolatis, 12.3-26.4 cm longis, 6.1-8.2 cm latis, basi cuneatis vel leviter rotundatis, apice acutis vel acuminatis, glabris.

Costam glabris, superioris tenuibus elevatis, leviter perspicuis, scalariformis, anastomosing prominentibus. Flores solitarius vel racemis 2-4 floribus, axillares vel extra axillares, pedicellis glabris, 1.5-2 cm longis, c. 1 mm crasi. Sepalis ovatis, apice acuminatus, extus rigide pubescentibus. Petalis linearis lanceolatis, c. 2.2 x 0.6 cm longis, apice acutus. Ovary glabris, stigmata cylindricus, rigide hispidulous.

Small tree c. 2 m high. *Branches* glabrous. *Leaves*: petiole 12-18 x 1.5-2.5 mm, glabrous; lamina chartaceous, ellipsoid oblong, 12.3-26.4 x 6.1-8.2 cm, base cuneate to rounded, apex acute to shortly acuminate, lower surface glaucous, glabrous; midrib glabrous on both sides; secondary veins faint, curved, 13-15 pairs, including with the midrib an angle of about 50-55 degree, glabrous; lateral veins anastomosing inconspicuous, tertiary veins scalariform (almost reticulate). *Flowers* solitary, axillary. *Pedice*l c.1 cm x c. 1 mm, glabrous. *Sepals* broadly ovate, apex acuminate. *Petals* 3, coriaceous, lanceolate, c. 2.2 x 0.6 cm, thick c. 1 mm, apex acuminate, reduplicate valvate, claw not distinct, velutinous. *Stamens* c. 2 x 1 mm, apex flat, glandular dots present. *Carpels* c. 2 x 0.5 mm; ovaries glabrous; stigmas sessile, cylindrical groove in the inner side, sparsely hispidulous. *Torus* convex. *Monocarps* not seen.

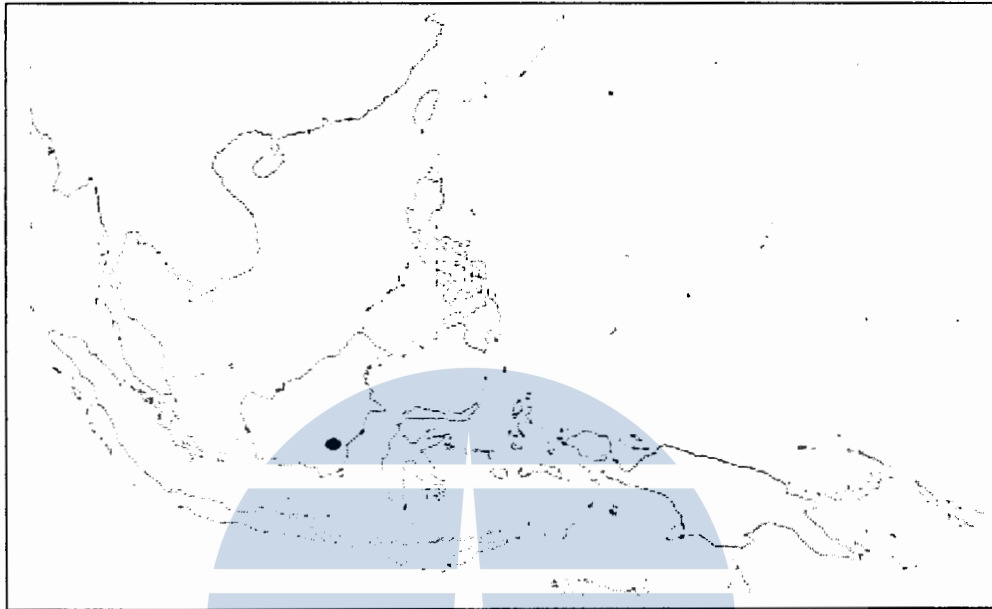
DISTRIBUTION : East Kalimantan.

FIELD NOTES : Petals yellowish red, young fruit green.

HABITAT & ECOLOGY : In secondary forest along logging road.

NOTE : This species allied to *D. blumei*, but differs in its much longer petioles, the type of monocarps, and the absence of the indument of the ovaries.

The numbers of ovule is 1(-2), it is indicated that the type of monocarpis is 1(-2) seeded.



Map 6 : Distribution of *D. borneense* Nurmawati sp. nov.



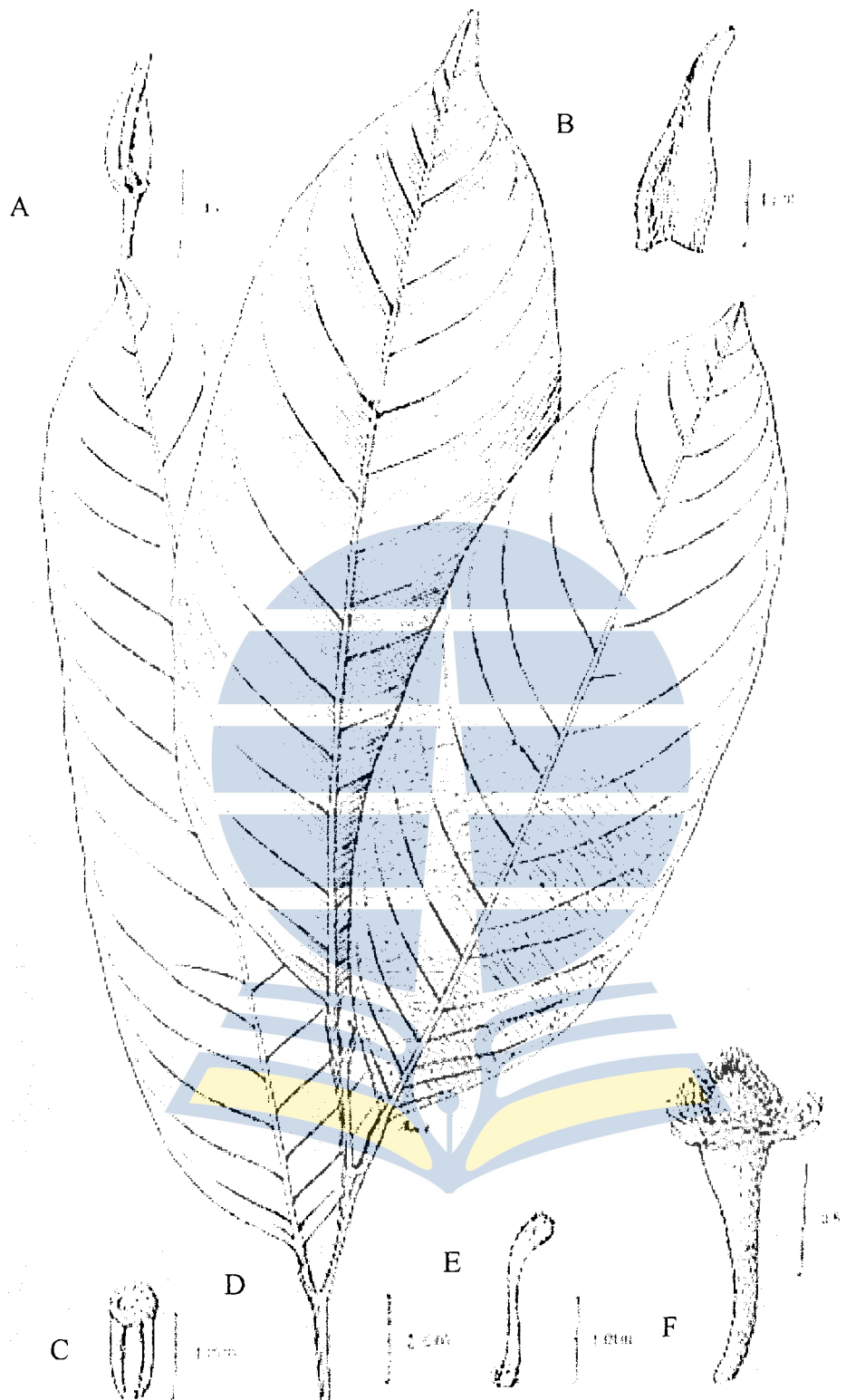


Fig. 6 : *D. borneense* Nurmawati sp. nov.

A. Flower, x 1; B. Remove petal, x 2; C. Stamen, x 20; D. Habit, x 0,5; E. Carpel, x 20; F. Carpels & stamens arrangement, x 7 (Ambriansyah & Arifin 1687)

INCOMPLETELY KNOWN SPECIES

***Dasymaschalon* sp.**

Branches sparsely tomentose. Petiole 8-14 x 1-1.5 mm. *Leaves* sparsely pubescent below; lamina narrowed oblanceolate, 6-22.5 x 3.6-6.2 cm, base cuneate, acuminate, scalariform; midrib pubescent on both sides; secondary veins faint, slightly stright, lateral nerve anastomosing not prominent.

NOTE : There are two sheets of steril specimen Scheffer 17898 from Java, Singawenang, Kilaja Areng which are hardly to identify. Their characters closely resemble *D. sootepense* Craib (Kew Bull 1912 : 144) a native of Siam.

EXCLUDED SPECIES

Dasymaschalon scandens Merr., Philip. J. Sc. 10 (1915) 238.— Type : *Merril* 9277 (holo PNH destr.) Philippine, Palawan, Tay-tay, May 1913. — Paratype : *Elmer* 12803 (BO!, L!) Puerto Princesa, Palawan.

NOTE : A paratype (*Elmer* 12803) which only bearing one partly destroyed flower, is available for examination. This species is quite different from other members of *Dasymaschalon*. It shows affinity with the genus *Mitrella* based on its scandent habit, the much less prominent nervation, the spreading petals, and the flat torus.

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Numerical list of taxa

1. *Dasymaschalon filipes* (Ridl.) Ban
2. *D. blumei* Finet & Gagnep.
- 2a. *D. blumei* Finet & Gagnep. var. *blumei*
- 2b. *D. blumei* Finet & Gagnep. var. *wallichii* (Hook.f & Thomson) Ban
3. *D. clusiflorum* (Merr.) Merr.
- 3a. *D. clusiflorum* (Merr.) Merr. var. *clusiflorum*
- 3b. *D. clusiflorum* (Merr.) Merr. var. *oblongatum* (Merr.) Ban
- 3c. *D. clusiflorum* (Merr.) Merr. var. *megalanthum* Merr.
- 3d. *D. clusiflorum* (Merr.) Merr. var. *minutiflorum* Nurmawati var. nov.
4. *D. ellipticum* Nurmawati sp. nov.
5. *D. hirsutum* Nurmawati sp. nov.
6. *D. borneense* Nurmawati sp. nov.

Identification list

This list contains the numbered collections examined. The figure after the colon refers to the number assigned to each taxon (see preceding list).

A.G. SAN 114914: 4. Ade et.al 19: 2a. Ahern 454, Forestry Bureau 25668: 3a.
 Alston A,H,G. 14646, 13233: 2a. Alvi 186: 2a. Amarillas F.L. Forestry
 Bureau 24662: 3a. Ambriansyah & Arifin 1687: 6. Ampuria J. s.n.: 3a.
 Anderson J.A.R. S25531: 2a. Anonuevo P. PNH 13658: 3a. Anonuevo PNH
 13577: 3a. ARK 22: 4. Aulia et.al. 15: 2a. Axelius B. 179: 2b.
 Backer 7415, 8814: 2a. nom.leg. s.n 154, 789, 915, 899, 17907: 2a. Bakhuizen
 R.C & van den Brink 1485: 2a. Blume C.L. s.n: 2a. Burkill H.M.1960: 2a.
 Burley J.S. & Tukirin 1708: 2b. Burley J.S. et.al 1671, 1211, 1708, 1618,
 2067: 2a. Carlo Hansen 1401: 2b.
 Castro A. PNH 5754: 3a. Cenabre A.L. PNH 28558: 3a. Cockburn P.F FRI 7144
 Cockburn P.F. FRI 7144: 2a. Conklin H.C & Buwaya PNH 73924, PNH
 80523, PNH 80253: 3a. Coode, M.J.E., et.al 6971: 4. Corner E.J.H. 28499:
 2a. Corner E.J.H. sn, 28682, 30130: 2b. *Culta*, Hort. Bot. Bogor IV.G., XI.
 A. 25, XX. D. 7a, XX. D.7, XX.D5a, XII B. V.6: 2a. Curran 10686: 3a.
 de Fogel 3005: 2a. de Wilde & Duyfjes 18887, 18859, 20384, 21339: 2b.
 Diepenhorst 2528: 2a. Dilmy A. s.n: 2a. Djoemadi 114: 2a.
 Edano, PNH 4052, PNH 15283: 3a. Elmer A.D.E. 7364, 11721: 3a. Espinoza
 B. 6421: 3a.
 Fenix E., Bureau of Science 29842: 3a. Forbes H.O. 1310: 2a. Fox R.B. 4857: 3a.
 Henderson 18457: 2a.
 Iboet 134: 2a.

- J. Sinclair 37298: 2a.
- Kadim & Noor 169: 5. Kochummen K.M. s.n : 1. Korthals s.n, 17723: 2a.
- Kostermans & van Woerden 155: 2a.
- Lagrimas M. 9778: 3a. Laumonier Y. 5588: 2a. Leonardo C.O. 3488: 3a.
- Limoos Boentoe 121: 2a.
- Martin Lagrimas PNH 56725, PNH 39382: 3a. Maxwell J.F. 7718: 2a. Maxwell J.F. 82273: 2b. Meijer W. 4275: 2a. Merrill 9703: 3b. Merritt M.H. 8674: 3a.
- Nengah Wirawan 111: 2a. NGS 1211: 2a. Nur s.n: 2b. nom. Leg PNH 59611: 3a nom. leg SAN 87718: 3d
- Okada H. et.al. 1400, 1344: 2a. OTH 19: 4.
- Penas N. 26723: 3a.
- Quisumbing R. & Del Rosario PNH 79847: 3a.
- Rahmat Si Boeea 9111, 6037: 2a. Rahmat Si Toroos 5393: 2a. Ramos & Edano Forestry Bureau 48208, 49277, 49318, 75330, 75382, 8373 : 3a. Ramos M. Bureau of Science 1675, 39748: 3a. Ramos & Edano s.n, Bureau of Science 42885, 44566, 48442: 3a. Ramos M. 1675: 3a. Ridley H.N 6812: 2a. Risdale et.al. ISU 371: 3a.
- Scheffer 17909, 17911: 2a. Shuji Yoshida 1636: 2a. Sibak Luang s.n: 4.
- Soepadmo & Mahmud 1134 : 1. Sulit M.D & Conklin H.C. PNH 16965: 3a.
- Sulit M.D. PNH 17143: 3a. Sun H.F. 9952: 2a. Supiah T. s.n, 14878: 2a.
- T.& P. 1057, 1120: 2a, 1120: 2b. Tamin & Arbain 7137, 7008: 2a. Teysmann 17910: 2b. Teysmann J.E s.n, 3630: 2a.
- Unesco 74: 5.

van Balgooy & van Setten 5292 A, 5647 A, 5679: 2a. Vogel & Vermeulen 6553:

3a.

Whitmore T.C. FRI 15774: 5. Wong Khoon Meng, FRI 32037 : 1. Woeryantoro

13,119: 2a.

