



Fig. 1. *Myrica javanica* Bl. a-c ♂, d-i ♀.—a. Flowering twig, b-c. flower analysis, d. flowering twig, e-g. flower analysis, h-i. longitudinal section of flower and fruit. (a & d nat. size, others enlarged.) After BLUME.

## MYRICACEAE (C. A. Backer, Heemstede)

### MYRICA

LINNÉ, Sp.Pl. (1753) 1024; Gen. Pl. ed. 5 (1754) no 981.—*Morella* LOUR. Fl. Coch. (1790) 548.

Trees or erect shrubs, often dotted with yellow glands and strongly aromatic. *Leaves* spirally arranged, exstipulate, or stipulate in young plants only, shortly petioled, simple, entire, serrate-dentate or more or less deeply pinnatisect, penninerved. *Flowers* in axillary, solitary or spiked or racemed catkins, (♂) (♀) or (♂♀); when the inflorescence is (♂♀), then the ♂ flowers below the ♀; each flower subtended by a bract. Sepals and petals absent, or the ♀ with 2 or more minute sepaloid bracteoles. ♂: *Stamens* 2–20, usually 2–4; filaments free or more or less connate into a column; anthers erect, 2-celled; cells opening by longitudinal slits. Rudimentary ovary, as a rule, absent. ♀: no staminodes. Ovary sessile, 1-celled. Style deeply bifid; branches short or longish, stigmatose on the inner side. Ovule 1, basal, erect, orthotropous. *Drupe* ovoid, ellipsoid or globose, tuberculate; endocarp hard. Seed erect, not comose; testa membranous; endosperm none; embryo straight; cotyledons plano-convex; radicle short.

Distr. Species according to CHEVALIER ca 50, but this number may be greatly reduced. By some authors the genus has been split into 3 genera, but I am inclined to accept only one.

N. and S. America, Canaries, tropical and S. Africa, Europe, N.-, tropical and East Asia, *Malaysia*, and Hawaii, not in Australia. In *Malaysia* 2 polymorphous species. Moreover, some forms, represented by inadequate materials from East *Malaysia*, may in the future prove worthy of specific rank. They will be dealt with at the end of this paper.

Ecol. Heliophilous, often gregarious, sometimes locally vulcanophile in the mountainous regions.

Uses. See under *M. javanica* BL.

Wood anat. MOLL & JANSSONIUS, Mikr. Holzes 6 (1936) 333. METCALFE & CHALK, Anat. Dic. 2 (1950) 1292. DEN BERGER, Determinatietabel Houtsoorten van Malesië (1949) 32 (hand lens).

#### KEY TO THE SPECIES (see also p. 279)

1. Leaves of adult specimens shallowly or coarsely but always distinctly serrate or crenate-serrate, 2–7½ cm wide, entirely hairless. Leaf-base acute or obtuse. Young branchlets quite glabrous. Stigmas narrowly ovate-triangular, ½–1¼ mm long . . . . . 1. *M. javanica*
1. Leaves of adult specimens quite entire, 1–4½ cm wide, usually more or less densely hairy. Leaf-base acute, rounded or cordate. Young branchlets usually hairy. Stigmas linear-filiform, ± 2½ mm long. . . . . 2. *M. esculenta*

1. *Myrica javanica* BL. Bijdr. (1825) 517; Fl. Jav. (1828) 7, t. 1; ZOLL. Syst. Verz. (1854) 86; MIQ. Fl. Ind. Bat. 1, 1 (1858) 871; Sum. (1860) 141; DC. Prod. 16, 2 (1868) 152; STAFF, Trans. Linn. Soc. Bot. 4 (1894) 231 incl. f. *alpina* STAFF; KOORD. Minah. (1898) 614; CHEVALIER, Mém. Soc. Nation. Sc. Nat. Cherb. 32 (1901) 213; K. & V. Bijdr. 9 (1903) 101; MERR. Philip. J. Sc. 2 (1907) Bot. 270; KOORD. Versl. Kon. Akad. Wet. A'dam 16 (1908) 646–652; Exk. Fl. 2 (1912) 48; Atlas Baumart. Java 2 (1914) t. 374; MERR. En. Born. (1921) 210; En. Philip. 2 (1923) 23; KOORD. Fl. Tjib. 2 (1923) 8; MARKGRAF, Bot. Jahrb. 59 (1925) 540; HEYNE, Nutt. Pl. (1927) 534; ANON. Trop. Natuur 17 (1928) 168; DOCT. v. LEEUWEN, Bull. J.B.B. III, 11 (1930) 49 et passim; Verh. Kon. Akad. Wet. A'dam 31 (1933) 155; t. 23; FREY-WYSSL. Trop. Natuur 22 (1933) 7, f. 7; v. MALM in FEDDE, Repert. 34 (1934) 270; STEEN. Bull. J.B.B. III, 13 (1936) 229; *ibid.* 17 (1948) 389; BACK. Bkn. Fl. Java, em. ed. 6 (1948) fam. 124, p. 1.—*M. macrophylla* MIRBEL, Mém.

Mus. Paris 14 (1827) 472, t. 72.—*M. vidaliana* ROLFE, J. Linn. Soc. Bot. 21 (1884) 316; VIDAL, Rev. Pl. Vasc. Filip. (1886) 259; CHEV. Mém. Soc. Nat. Sc. Nat. Cherb. 32 (1901) 213.—Fig. 1.

Much branched tree or erect shrub, 2–10 m high, exceptionally up to 20 m; trunk crooked; no buttresses. Crown rather dense. Branchlets greyish black, hairless, densely beset with sessile yellow glands when young. *Leaves* elliptic, obovate or oblong-obovate from an acute or obtuse base, at the apex rounded, very obtuse, or sometimes slightly emarginate, shallowly to rather coarsely serrate or crenate-serrate, firmly coriaceous, hairless, when very young on both sides rather densely beset with sessile yellow glands, afterwards, especially on the upper surface, soon losing the glands which leave shallow pits, 4–14 cm by 2–7½ cm; midrib strongly prominent beneath; lateral nerves on either side of the midrib 5–12, erecto-patent, often forked, frequently ending in a short, thick marginal toothlet, faintly prominent to slightly depressed above,

rather prominent beneath; petiole firm,  $1/2$ – $1\frac{1}{2}$  cm. *Flowers* ( $\delta$ ) ( $\varnothing$ ), very exceptionally a few  $\varnothing$  flowers among the  $\delta$  ones.  $\delta$ : *Inflorescences* solitary in the leaf-axils, erect to widely patent, 4–18 cm long (peduncle included); rachis clothed with numerous yellow glands and many more or less patent short hairs, in the higher part bearing several at last widely patent catkins, rarely bearing part of the catkins on short secondary branchlets; catkins solitary in the axil of an ovate, acute, 2–3 mm long bract, sessile,  $3/4$ –3 cm long. Single flowers in the axil of a bract; floral bracts quite free from the staminal column, ovate, shortly acuminate, strongly vaulted, shortly hairy along the margin and on the back and studded with yellow glands, 2– $2\frac{1}{2}$  mm long, persistent. Stamens usually 4, very rarely 3 (see note); filaments for the greater part of their length connate into a shorter or longer column; staminal column thick, thinly patently hairy and studded with yellow glands. Anthers shortly stalked, vertical, contiguous, thick, with many sessile glands, bivalved; no rudimentary ovary.  $\varnothing$ : *Inflorescences* solitary in the leaf-axils, erect or erecto-patent, not or sparingly branched, rather lax, 3–7 cm long; rachis clothed with very many sessile yellow glands and a number of patent short hairs; catkins solitary in the axil of an ovate-triangular acute,  $1\frac{1}{2}$ –2 mm long bract, 5–10 mm long very dense. Flowers 5 or more, imbricate, each in the axil of a small ovate, acute hairy bract. Bracteoles at the base of the flower 2, appressed against the ovary, ovate, shortly acuminate, ciliate, hairy and glandular on the back,  $3/4$ –1 mm long. Ovary ellipsoid-ovoid, very densely studded with short rounded tubercles. Stigmas 2, sessile, spreading narrowly, ovate-triangular, acute, flat, red,  $1/2$ – $1\frac{1}{4}$  mm long. Berries 1 or rarely 2 per catkin, broadly ellipsoid, with many yellow glands, otherwise glabrous, black with bluish violet juice, rather acid not palatable.

*Distr. Malaysia*: Central Sumatra, Java (Mt Salak to Mt Jang), Lesser Sunda Islands (Bali, Lombok), N. and Central Borneo, Philippines, N. and S. Celebes, New Guinea, 900–3300 m.

*Ecol.* Prefers open, sunny, stony localities, often near active craters, on ridges, and lavastreams, there often forming a pioneer-vegetation and becoming gregarious, elsewhere mixed with other shrubs and small trees forming a rather dense jungle in which it may predominate. *Fl. fr.* Jan.–Dec.

*Vern. Mangkoan, pitjisan, sang, wuru kêtèk, J, tètèkèan, tèkè, S, Philippines: Hindang (C.Bis.)*

*Uses.* The wood furnishes a highly valued fuel. An excellent charcoal is made of it. Ripe berries are edible. Cultivated for reforestation, also as a road-side or a court-yard tree.

*Note.* Fruits sought after by several species of birds, *i.a.* pigeons, which spread the seeds. In the crop of a single pigeon 144 viable seeds were found. On Mt Kinabalu epiphytic specimens were said to have been collected on big trees by M. S. CLEMENS in Aug. 1933.

Not too young juvenile forms possess obovate, rather deeply, narrowly and very acutely serrate

leaves of  $2\frac{1}{2}$ –6 cm by  $1\frac{1}{2}$ –3 cm; leaf-teeth with a thickened apex; stipules narrowly ovate-lanceolate, acute, 2–4 mm long, caducous.

*M. vidualiana* ROLFE *l.c.* is a Philippine form of this species with small ( $1\frac{1}{2}$ –6 cm by  $3/4$ –2 cm), shallowly serrate leaves. Male inflorescences small; stamens 3, rarely 2. This form passes into typical *M. javanica* by intergrades.

2. *Myrica esculenta* BUCH.–HAM in D. DON, *Prod. Fl. Nep.* (1825) 56; CHEV. *Mém. Soc. Nation. Sc. Nat. Cherb.* 32 (1901) 204 *incl. var. farquhariana* (WALL.) CHEV., *var. lobbii* (T. & B.) CHEV. and *var. sapida* (WALL.) CHEV.; MERR. *Philip. J. Sc.* 2 (1907) Bot. 269; (*aesculenta*) GAMBLE, *J. As. Soc. Beng.* 75 (1915) 404 *incl. var. auriculata* GAMBLE; MERR. *En. Born.* (1921) 210; *En. Philip.* 2 (1923) 23; *Philip. J. Sc.* 29 (1926) 362, *sphalm. farquhariana*; STEEN. *Bull. J.B.B. III*, 13 (1936) 229; BACK. *Bekn. Fl. Java em. ed.* 6 (1948) fam. 124, p. 1.—*M. farquhariana* WALL. *Tent. Fl. Nep.* (1826) 61; DC. *Prod. 16*, 2 (1868) 152; RIDL. *Fl. Mal. Pen.* 3 (1924) 370, f. 157; BURK. *Dict.* 2 (1935) 1521; CORNER, *Ways. Tr.* (1940) 417, f. 158.—*M. sapida* WALL. *Tent. Fl. Nep.* (1826) 59, t. 45.—*M. rubra mult. auct. non* SIEB. & ZUCC. *Abh. Akad. München* 4<sup>3</sup> (1846) 230.—*M. longifolia* T. & B. [*Cat. ined.* Hort. Bog. (1854) 63, 241] *ex* MIQ. *Fl. Ind. Bat.* 1, 1 (1858) 872; DC. *Prod. 16*, 2 (1868) 152; K. & V. *Bijdr.* 9 (1903) 103; KOORD. *Versl. Kon. Akad. Wet. A'dam* 16 (1908) 652; *Exk. Fl.* 2 (1912) 49; v. MALM in FEDDE, *Rep.* 34 (1934) 270; STEEN. *Bull. J.B.B. III*, 13 (1936) 229.—*M. lobbii* T. & B. *ex* MIQ. *Fl. Ind. Bat.* 1, 1 (1858) 872; DC. *Prod. 16*, 2 (1868) 684 (*addenda*); CHEVALIER, *l.c.* p. 204.—*M. nagi* (*non* THUNB.) RIDL. *Agr. Bull. Str. & F.M.S.* 1 (1901) 258; ?*an* MERR. *En. Philip.* 2 (1923) 23.—*M. auriculata* RIDL. *Fl. Mal. Pen.* 3 (1924) 371.

Small tree, 3–15 m high; trunk crooked, irregularly branched; bark grey. Branchlets usually moderately densely clothed with patent, longish, less often short, thin hairs, mixed with scattered sessile yellow glands, sometimes hairless and more or less densely glandular only. *Leaves* lanceolate, lanceolate-obovate or oblong-obovate, from a gradually narrowed, acute, narrowly rounded or (young trees) narrowly cordate base, acuminate or not, with an acute or rather acute, less often obtuse apex, on adult trees entire and firmly coriaceous, on the upper surface with or without minute yellow glands, beneath bearing many caducous minute glands which leave a shallow pit on falling off, ciliate or not, either thinly pubescent on both surfaces (especially on larger nerves), or only beneath, or quite glabrous, shining darkgreen above, on adult trees  $2\frac{1}{2}$ –15 cm by 1– $4\frac{1}{2}$  cm (for very young trees see beneath); midrib strongly prominent beneath; lateral nerves on either side of midrib 5–15, obliquely erect or ascending from a patent base, inarching near the margin or not, prominent beneath. Petiole firm, pubescent or glabrous, 2–10 mm. *Flowers* ( $\delta$ ) ( $\varnothing$ ).  $\delta$ : *inflorescences* solitary in the leaf-axils, erecto-patent to widely patent, 3–8 cm long (short peduncle included). Rachis thin, usually rather densely clothed with more or less patent,

longish or short white hairs, between the hairs with scattered yellow glands, sometimes hairless and glandular only, bearing several rather remote, at last widely patent catkins; catkins singly in the axil of a triangular,  $1\frac{1}{2}$ – $2\frac{1}{2}$  mm long, hairy bract, sessile or shortly stalked,  $\frac{1}{2}$ – $1\frac{1}{2}$  cm long, dense or rather lax; their rachis patently hairy. Floral bracts ovate-triangular, patently hairy on the back,  $\pm 1\frac{1}{4}$  mm long. Stamens 4, rarely 3, very rarely 2; filaments connate at the base into a column  $\frac{1}{4}$ – $\frac{1}{2}$  mm long; anthers distinctly or hardly stalked, vertical, contiguous, thick, red, beset with numerous very short, comparatively thick hairs,  $\pm \frac{3}{4}$  mm long; no rudimentary ovary. ♀: *Inflorescences* solitary in the leaf-axils, erect or more or less widely patent,  $1\frac{1}{2}$ –5 cm long, simple. Rachis thin, mostly clothed with patent longish or short hairs, mixed with scattered yellow glands, sometimes hairless. Catkins in the lower part remote, higher up often crowded, placed singly in the axil of an ovate-triangular, hairy,  $1\frac{1}{4}$ –3 mm long bract, sessile,  $1\frac{1}{2}$ –2 mm long, consisting of 10 or fewer densely crowded flowers. Floral bracts ovate-triangular, acute, hairy and glandular,  $\pm 1\frac{1}{2}$  mm long. Bracteoles very minute, ovate-triangular, pubescent,  $\pm \frac{1}{3}$  mm long. Ovary hairy when young. Styles at last spreading or reflexed; filiform-subulate, hairy at the base,  $\pm 2\frac{1}{2}$  mm long. *Berries* red, 1–3 per catkin, ellipsoid, beset with broadly rounded tubercles, red,  $\pm 1$  cm long.

Distr. SE. Asia, Malay Peninsula, Sumatra, Banka, Billiton, Borneo, Java (rather rare and

local), Philippines, Lesser Sunda Islands (Bali, Lombok, Sumba, Flores), from the plains up to  $\pm 1700$  m.

Ecol. Light forest, jungles, locally numerous, with preference for dry, well-drained situations, in the Malay Peninsula both on hot sandy dunes and on stony laterites. *Fl. fr.* Jan.–Dec.

Vern. *Ki keper*, S, *samben*, *woru gesik*, J, *menkikir(an)* (M, Bill.), *silom* (Bat.), *kětinah* (Sumba). Moreover, some local names. Mal. Peninsula: *Telur chickah*, *gělincek*, *kěsamí*, *keteng*, *lěnteking*, *kayteng*, *kusama*, *gilinche*.

Notes. The closely allied *M. rubra* (LOUR.) S. & Z. (*M. nagi* DC.; *non* THUNB. *quae est Podocarpus!*) seems to differ only by its larger ( $1\frac{1}{4}$ – $1\frac{1}{2}$  cm diam.) edible fruits, for which it is cultivated in Cochinchina, China and Japan. I have seen no authentic specimens and must refrain from pronouncing a definite opinion, whether it is specifically distinct.

Leaves of seedlings are stipulate, subsessile, narrowly lanceolate-obovate from a narrowly cordate base, acute, sharply and often coarsely serrate or often pinnatisect, thin, 20–35 by 5–7 cm; lateral nerves on either side of midrib up to 15; stipules narrowly ovate-lanceolate, very acute,  $\frac{1}{2}$ – $\frac{3}{4}$  cm long, deciduous. See also CORNER (1940) and STEEN. (*Fl. Mal. I*, 4, 1948, xx).

As the tree grows up the juvenile form passes very gradually into the adult form; lateral shoots of old trees may repeat the juvenile form.

#### INSUFFICIENTLY KNOWN MALAYSIAN FORMS OF MYRICA

(1) *Myrica* specimens, collected in 1912 by STRESE-MANN on Mt Sofia in Central Ceram (*no* 20 and 132) and a ♂ specimen from Mt Togha, Buru (*no* 379), preserved in the herbaria at Leyden and Bogor, possess densely woolly young shoots, and crowded, oval-oblong, firmly coriaceous, very shallowly but distinctly serrate, 4–5 cm long,  $1\frac{1}{2}$ –3 cm wide *leaves* with an acute or obtuse base and an obtuse or rounded apex, in a young state densely woolly on both surfaces, glabrescent above except on the larger nerves, much more persistently hairy beneath, densely gland-dotted on the lower surface, much less densely so above; midrib much prominent beneath; lateral nerves on either side of midrib 4–8, rather widely patent, prominent beneath; petiole densely hairy,  $\frac{1}{2}$ –1 cm. *No* 20 is sterile; *no* 379 bears young male inflorescences, 6–7 cm long; main-axis densely woolly; catkins several,

spicate, patent, very dense,  $\pm \frac{3}{4}$  cm long; their rachis thinly patently short-hairy; floral bracts broadly ovate, densely woolly on the back,  $\pm 2$  mm long; stamens 4 or sometimes 3; filaments connate below; anthers vertical, thick, hairless, gland-dotted.

As the female flowers, the styles of which afford in this genus an important character, are as yet unknown I must refrain from naming it. It is certainly closely allied to *M. javanica* of which it may be a deviating form.

(2) The Arnold Arboretum Herbarium possesses a very small-leaved *Myrica* species collected in New Guinea (BRASS 10938, Oct. 1938), with very young ♀ flowers unfit for examination and description. It is clearly allied to *M. javanica* and may be one of the numerous forms of this very polymorphous plant.

#### Excluded

*Myrica luzonica* VIDAL, Sin. Atlas (1883) 40, t. 90, f. B; ROLFE, J. Linn. Soc. Bot. 21 (1884) 316

= *Sapium luzonicum* (VIDAL) MERR. (*Euphorbiaceae*).