

4. MELICOPE J. R. Forster & G. Forster, Char. Gen. Pl. 28. 1775.

蜜茱萸属 mi zhu yu shu

Zhang Dianxiang (张奠湘); Thomas G. Hartley

Shrubs, trees, rarely scandent, evergreen, usually dioecious or sometimes monoecious or andromonoecious. Leaves opposite [or whorled], digitately 3-foliolate or 1-foliolate. Inflorescences axillary or basal to leaves, cymulose to thyriform [or reduced to solitary flowers]. Sepals 4, connate at base or to nearly their full length. Petals 4, valvate or narrowly imbricate in bud. Stamens 4 or 8 [or 4–8], rudimentary in female flowers. Disk pulvinate to annular to cup-shaped. Gynoecium 4-carpelled, rudimentary or lacking in male flowers; ovaries connate at base, otherwise contiguous [or connate up to their full length]; ovules [1 or] 2 per locule; style apical or subapical, of 4 contiguous, coherent, or connate styler elements; stigma usually punctiform, capitellate, or capitate. Fruit of 1–4 basally connate follicles [or grading to a syncarpous 4-loculed loculicidal capsule]; exocarp dry to fleshy; endocarp cartilaginous. Seeds remaining attached in dehiscent fruit; seed coat with thick inner layer of dense black sclerenchyma and spongy outer layer bounded externally by a shiny black pellicle; endosperm copious; embryo straight or slightly curved; cotyledons elliptic, flattened; hypocotyl superior.

About 233 species: E, S, and SE Asia, Australia, Indian Ocean islands (Mascarenes), Madagascar, Pacific islands; eight species (two endemic) in China.

As discussed by Hartley (Allertonia 8: 19, f. 5. 2001), two types of attachment of mature seed are seen in dehiscent fruit of *Melicope*. In Type A, the attachment is by a partially detached axile strip of pericarp tissue or by a partially detached raphe, or by both. In Type B, neither the axile pericarp tissue nor the raphe is detached, and the seed is connected to the axile placental region by a funiculus, which is simply the funiculus of the ovule enlarged.

1a. Stamens 8; seed attachment Type A.

- 2a. Leaves 1-foliolate; follicles ellipsoid to obovoid, ca. 6.5 mm 1. *M. patulinervia*
- 2b. Leaves mostly 3-foliolate; follicles subglobose, 3–4.5 mm 2. *M. triphylla*

1b. Stamens 4; seed attachment Type B.

- 3a. Inflorescences 0.7–1.8(–2) cm wide; apex of staminal filaments at least in male and bisexual flowers obtuse or narrowly so or sometimes acute; petals usually persistent in fruit; leaves 3-foliolate and/or 1-foliolate.
 - 4a. Petioles sparsely puberulent to pubescent adaxially, otherwise glabrous or nearly so 7. *M. viticina*
 - 4b. Petioles pubescent to velutinous all around 8. *M. glomerata*
- 3b. Inflorescences 1.5–16 cm wide; apex of staminal filaments at least in male and bisexual flowers subulate to filiform; petals usually deciduous in fruit; leaves mostly 3-foliolate.
 - 5a. Young branchlets 4.5–10 mm wide in third internode; leaflet blades abaxially strigillose to ± appressed villosulous 4. *M. semecarpifolia*
 - 5b. Young branchlets 2–4.5 mm wide in third internode; leaflet blades abaxially glabrous to puberulent.
 - 6a. Larger primary branches of inflorescences usually spreading; leaflet blades ovate-elliptic, elliptic, or elliptic-obovate, or narrowly so; inflorescences 2–10 × 1.5–8 cm; pedicel sparsely puberulent to pubescent 6. *M. pteleifolia*
 - 6b. Larger primary branches of inflorescences usually ascending; leaflet blades usually elliptic or narrowly so; inflorescences 4.5–32 × 3–16 cm; pedicel glabrous to tomentulose.
 - 7a. Leaflet blades elliptic, sometimes ovate-elliptic, or rarely obovate; inflorescences 8–32 × 3–16 cm; pedicel nearly glabrous to tomentulose 3. *M. lunu-ankenda*
 - 7b. Leaflet blades ± narrowly elliptic; inflorescences 4.5–9 × 3–4.5 cm; pedicel glabrous 5. *M. chunii*

1. *Melicope patulinervia* (Merrill & Chun) C. C. Huang, Acta Phytotax. Sin. 6: 132. 1957.

蜜茱萸 mi zhu yu

Euodia patulinervia Merrill & Chun, Sunyatsenia 5: 87. 1940.

Shrubs 1–3 m tall. Young branchlets 2–3 mm wide in third internode. Leaves 1-foliolate, glabrous; petiole 0.2–3 cm; leaflets sessile; leaflet blades elliptic, narrowly elliptic, or elliptic-obovate, 5–15 × 1.5–6 cm, apex acute to acuminate. Inflorescences axillary, to 3 cm. Sepals most likely in female

flowers, ca. 0.5 mm, outside sparsely puberulent, basally connate, deciduous in fruit. Petals ca. 1.5 mm, deciduous in fruit. Stamens 8, shorter than petals. Gynoecium glabrous; ovary globose; style very short. Inflorescences 1–2 × 1.3–2.5 cm; peduncle 3–10 mm. Pedicel 2–3.5 mm, sparsely puberulent. Fruit follicles ellipsoid to obovoid, ca. 6.5 mm, glabrous. Seeds ellipsoid to obovoid, 4–5 mm, attachment Type A. Fl. Mar–Apr, fr. Sep–Oct.

• Dense or ± open forests; 700–900 m. Hainan.

2. *Melicope triphylla* (Lamarck) Merrill, Philipp. J. Sci., C, 7:

375. 1912.

三叶蜜茱萸 san ye mi zhu yu

Fagara triphylla Lamarck, Encycl. 2: 447. 1788; *Acronychia minahassae* (Teijsmann & Binnendijk) Miquel; *Ampacus incerta* (Blume) Kuntze; *A. triphylla* (Lamarck) Kuntze; *Bergera ternata* Blanco; *Euodia anisodora* Lauterbach & K. Schumann; *E. awadan* Hatusima; *E. glaberrima* Merrill; *E. incerta* Blume; *E. laxireta* Merrill; *E. microsperma* F. M. Bailey; *E. minahassae* Teijsmann & Binnendijk; *E. philippinensis* Merrill & L. M. Perry; *E. triphylla* (Lamarck) Candolle; *Melicope awadan* (Hatusima) Ohwi & Hatusima; *M. currantii* Merrill; *M. densiflora* Merrill; *M. gjellerupii* Lauterbach; ?*M. kanehirae* Hatusima; *M. luzonensis* Engler ex Perkins; *M. mahonyi* F. M. Bailey; *M. mindanaensis* Elmer; *M. monophylla* Merrill; *M. monophylla* var. *glabra* Elmer; *M. nitida* Merrill; *M. obtusa* Merrill; *M. odorata* Elmer; *M. rupestris* Lauterbach; *Zanthoxylum triphyllum* (Lamarck) G. Don.

Shrubs or trees, 1.5–6 m tall, dioecious or sometimes monoclinal or andromonoecious. Young branchlets 3–4 mm wide in third internode. Leaves 3-foliolate (occasional leaves 1-foliolate), glabrous; petiole 2–6.5 cm; leaflet blades obovate, oblanceolate, or rarely elliptic, in terminal leaflet 5–12 × 2–4.5 cm, apex acuminate or rarely acute. Inflorescences axillary, 3–7 × 2–6 cm; peduncle obsolete or to 1.5 cm. Pedicel 1.5–3 mm and of similar length in fruit, glabrous. Sepals 0.5–0.8 mm, glabrous or with a few trichomes at apex, connate at base or to ± half their length, persistent in fruit. Petals 2.5–3.5 mm, deciduous in fruit. Stamens 8, in male and bisexual flowers those opposite sepals 2–4 mm and in female flowers 0.5–3.5 mm; filaments at least in male and bisexual flowers acute to subulate at apex. Gynoecium glabrous, in female and bisexual flowers 0.8–1.6 mm, in male flowers 0.3–0.5 mm. Fruit follicles subglobose, 3–4.5 mm, glabrous. Seeds ellipsoid to obovoid, 3–4.5 mm, attachment Type A.

Forests, thickets, open places; low elevations. Taiwan [Indonesia, Japan (Ryukyu Islands), New Guinea, Philippines; SW Pacific islands].

3. *Melicope lunu-ankenda* (Gaertner) T. G. Hartley, Sandakania 4: 61. 1994.

三刈叶蜜茱萸 san yi ye mi zhu yu

Fagara lunu-ankenda Gaertner, Fruct. Sem. Pl. 1: 334. 1788; *Ampacus aromatica* (Blume) Kuntze; *Euodia arborea* Elmer; *E. arborescens* D. D. Tao; *E. aromatica* Blume; *E. concinna* Ridley; *E. lucida* (Miquel) Miquel; *E. lunu-ankenda* (Gaertner) Merrill; *E. lunu-ankenda* var. *tirunelvelica* A. N. Henry & Chandrabose; *E. marambong* (Miquel) Miquel; *E. obtusifolia* Ridley; *E. punctata* Merrill; *E. roxburghiana* (Chamisso) Benth; *E. roxburghiana* var. *longipes* Craib; *E. triphylla* (Lamarck) Candolle var. *pubescens* Ridley; *Zanthoxylum aromaticum* (Blume) Miquel; *Z. lucidum* Miquel; *Z. marambong* Miquel; *Z. roxburghianum* Chamisso.

Trees to 30 m tall, dioecious. Young branchlets 2.5–4.5 mm wide in third internode. Leaves 3-foliolate; petiole 2–12 cm, glabrous to tomentulose; leaflet blades elliptic, sometimes ovate-

elliptic, or rarely obovate, in terminal leaflet 6–21 × 2.5–8.5 cm, glabrous or puberulent to sparsely puberulent on midvein especially abaxially and sometimes on secondary veins abaxially, apex acuminate. Inflorescences axillary, 8–32 × 3–16 cm; peduncle 4–15 cm; larger primary branches usually ascending. Pedicel 0.3–2.5 mm but 1–5 mm in fruit, nearly glabrous to tomentulose. Sepals 0.5–1 mm, connate at base or to ca. 1/4 their length, glabrous or outside puberulent, persistent in fruit. Petals 1.5–2.5 mm, deciduous or subsistent in fruit. Stamens 4, in male flowers 2–4 mm, in female flowers 0.5–2.5 mm; filaments at least in male flowers subulate to filiform at apex. Gynoecium in female flowers 1–3 mm, in male flowers 0.2–0.5 mm; ovary nearly glabrous to shortly pubescent or ± sparsely villous. Fruit follicles ellipsoid, 4.5–5 mm, glabrous to sparsely puberulent. Seeds subglobose, ovoid, or ellipsoid, 3.5–4 mm, attachment Type B. Fr. Aug–Sep.

Montane forests; ca. 900 m. SE Xizang (Mêdog) [Bhutan, Cambodia, India, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

4. *Melicope semecarpifolia* (Merrill) T. G. Hartley, Fl. Taiwan, ed. 2, 3: 522. 1993.

台灣蜜茱萸 tai wan mi zhu yu

Euodia semecarpifolia Merrill, Publ. Bur. Sci. Gov. Lab. 35: 23. 1906; *E. camiguinensis* Merrill; *E. merrillii* Kanehira & Sasaki; *E. retusa* Merrill.

Small trees, dioecious. Young branchlets 4.5–10 mm wide in third internode. Leaves 3-foliolate; petiole 3.5–14 cm, ± appressed pilose or appressed villous when young; leaflet blades elliptic to obovate, in terminal leaflet 7.5–30 × 3–12 cm, both surfaces strigillose to ± appressed villosulous on midvein and often abaxially on secondary veins, apex acuminate or sometimes rounded or acute. Inflorescences axillary and sometimes basal to leaves, 3–9.5 × 2.5–8 cm; peduncle obsolete or to 3.5 cm; larger primary branches usually spreading. Pedicel obsolete or to 2.5 mm, but 0.5–3 mm in fruit, glabrous to villosulous. Sepals 0.8–1 mm, connate at base or to ca. 1/4 their length, nearly glabrous to outside sericeous, persistent in fruit. Petals 2–2.5 mm, deciduous or subsistent in fruit. Stamens 4, in male flowers 3.5–4.5 mm, in female flowers 1–2 mm; filaments at least in male flowers subulate to filiform at apex. Gynoecium in female flowers ca. 1.5 mm, in male flowers 0.5–1 mm; ovary sericeous. Fruit follicles subglobose, 4–4.5 mm, nearly glabrous or sparsely pilose. Seeds subglobose to ovoid to ellipsoid, 3.5–4 mm, attachment Type B. Fl. Jun–Jul, fr. Nov–Dec.

Forests, thickets; lower and middle elevations. Taiwan [Philippines].

5. *Melicope chunii* (Merrill) T. G. Hartley, Allertonia 8: 237. 2001.

海南蜜茱萸 hai nan mi zhu yu

Euodia chunii Merrill, J. Arnold Arbor. 6: 132. 1925; *E. leptota* Merrill var. *chunii* (Merrill) C. C. Huang.

Shrubs or trees, 1.5–12 m tall, dioecious. Young

branchlets 2–3 mm wide in third internode. Leaves 3-foliolate; petiole 2–6 cm, glabrous or sparsely puberulent; leaflet blades ± narrowly elliptic, in terminal leaflet 5–12 × 1.5–3.5 cm, glabrous, apex acuminate or sometimes acute. Inflorescences axillary, 4.5–9 × 3–4.5 cm; peduncle 2–3.5 cm; larger primary branches ascending. Pedicel 2–3.5 mm but 3–4 mm in fruit, glabrous. Sepals 0.5–0.7 mm, connate at base or to ca. 1/4 their length, glabrous or margin irregularly ciliate, persistent in fruit. Petals 2–2.5 mm, deciduous in fruit. Stamens 4, in male flowers 2.5–3 mm, in female flowers 1.5–2.5 mm; filaments at least in male flowers subulate to filiform at apex. Gynoecium in female flowers 1.5–2 mm, in male flowers 0.2–0.5 mm; ovary sparsely hirsutulous. Fruit follicles ellipsoid or obovoid, 5–6 mm, glabrate. Seeds subglobose to ellipsoid, 2.5–3.6 mm, attachment Type B.

- Forests; below 400 m. Hainan.

6. *Melicope pteleifolia* (Champion ex Benth) T. G. Hartley, Fl. Taiwan, ed. 2, 3: 521. 1993.

三桠苦 san ya ku

Zanthoxylum pteleifolium Champion ex Benth, Hooker's J. Bot. Kew Gard. Misc. 3: 350. 1851; *Euodia gracilis* Kurz; *E. lept*a Merrill, nom. illeg. superfl.; *E. lept*a var. *cambodiana* (Pierre) C. C. Huang; *E. oreophila* Guillaumin (1945), not Guillaumin (1938); *E. pteleifolia* (Champion ex Benth) Merrill; *E. triphylla* (Lamarck) Candolle var. *cambodiana* Pierre; *Ilex lept*a Sprengel, nom. illeg. superfl.; *Lepta triphylla* Loureiro.

Shrubs or trees, rarely scandent, 1–14 m tall, dioecious or rarely monoclinal. Young branchlets 2.5–4 mm wide in third internode. Leaves 3-foliolate (occasional leaves 1-foliolate); petiole 1.5–14 cm, glabrous to pubescent; leaflet blades ovate-elliptic, elliptic, elliptic-obovate, or narrowly so, in terminal leaflet 6–22 × 2–8 cm, glabrous or puberulent on midvein especially abaxially, apex acuminate or subcaudate. Inflorescences axillary and sometimes basal to leaves, 2–10 × 1.5–8 cm; peduncle 0.4–5 cm; larger primary branches usually spreading. Pedicel 0.6–3 mm but 1.5–6 mm in fruit, sparsely puberulent to pubescent. Sepals 0.5–1(–1.5) mm, connate at base or to ca. 1/4 their length, glabrous or outside pubescent, persistent in fruit. Petals 1.3–2(–2.5) mm, deciduous or rarely persistent in fruit. Stamens 4, in male and bisexual flowers 1.5–3(–4) mm, in female flowers 0.4–1.5 mm; filaments at least in male and bisexual flowers subulate to filiform at apex. Gynoecium in female and bisexual flowers 1–2 mm, in male flowers 0.2–0.5 mm; ovary glabrous to pubescent. Fruit follicles subglobose to ellipsoid to obovoid, (3–)3.5–7.5 mm, glabrous or sparsely puberulent. Seeds subglobose to ovoid to ellipsoid, 2.5–4 mm, attachment Type B. Fl. Apr–Jun, fr. Jul–Oct.

Evergreen and mixed deciduous forests and forest margins, thickets, swamp forests, open places; near sea level to 2300(–2800) m. Fujian, Guangdong, SW Guangxi, Hainan, S Jiangxi, Taiwan, Yunnan, SE Zhejiang [Cambodia, Laos, Myanmar, Thailand, Vietnam].

7. *Melicope viticina* (Wallich ex Kurz) T. G. Hartley, Allertonia 8: 262. 2001.

单叶蜜茱萸 dan ye mi zhu yu

Euodia viticina Wallich ex Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 64. 1873.

Shrubs or trees, 0.8–6 m tall, dioecious or sometimes monoclinal. Young branchlets 1–3 mm wide in third internode. Leaves 1- or 3-foliolate. Leaves 3-foliolate: petiole 1.5–7 cm, adaxially sparsely puberulent to pubescent, otherwise glabrous or nearly so; leaflet blades elliptic or elliptic-obovate, or narrowly so, or rarely obovate or oblanceolate, in terminal leaflet 5.5–21 × 1.5–6.5 cm, glabrous or sparsely puberulent to shortly pubescent on midvein, apex acuminate or rarely acute. Leaves 1-foliolate: petiole 0.3–4.5 cm; leaflet blades elliptic or elliptic-obovate, or narrowly so, 2.2–22 × 0.7–7.5 cm, otherwise similar to 3-foliolate leaves. Inflorescences axillary and sometimes basal to leaves, 0.5–5(–8.5) × 0.7–1.8(–2) cm; peduncle obsolete or to 2.5 cm; larger primary branches spreading or ascending. Pedicel 0.5–1.5 mm but 1.5–3 mm in fruit, glabrous to sparsely puberulent. Sepals 1–1.8 mm, connate at base, glabrous or outside sparsely puberulent, persistent in fruit. Petals 2.5–3 mm, persistent or rarely deciduous in fruit. Stamens 4, in male and bisexual flowers 2.2–3 mm, in female flowers 0.8–1.5 mm; filaments at least in male and bisexual flowers obtuse or narrowly so at apex. Gynoecium in female and bisexual flowers 1.5–2 mm, in male flowers 0.3–0.6 mm; ovary glabrous or rarely sparsely pubescent. Fruit follicles subglobose to ellipsoid, 5–7 mm, glabrous. Seeds ovoid to ellipsoid, 4–6.5 mm, attachment Type B. Fl. Apr–May, fr. Aug–Oct.

Open forests; 500–1300 m. S Yunnan [Cambodia, Laos, Myanmar, Thailand, Vietnam].

Plants mistakenly treated as *Euodia simplicifolia* Ridley var. *simplicifolia* by C. C. Huang (Fl. Reipubl. Popularis Sin. 43(2): 58. 1997) belong here.

8. *Melicope glomerata* (Craib) T. G. Hartley, Allertonia 8: 263. 2001.

密果蜜茱萸 mi guo mi zhu yu

Euodia glomerata Craib, Bull. Misc. Inform. Kew 1918: 362. 1918; *E. simplicifolia* Ridley var. *pubescens* C. C. Huang.

Shrubs 0.5–1.5 m tall or rarely trees to 11 m tall, dioecious or rarely monoclinal. Young branchlets 2–4.5 mm wide in third internode. Leaves 1- or 3-foliolate. Leaves 3-foliolate: petiole 1.5–7 cm, pubescent to velutinous; leaflet blades elliptic to obovate, or narrowly so, in terminal leaflet 3.5–16 × 1.3–6.5 cm, pubescent or sparsely so at least abaxially on midvein and secondary veins and adaxially on midvein, apex obtuse to acuminate. Leaves 1-foliolate: petiole 0.8–1.5 cm; leaflet blade elliptic to obovate, 4–9.5 × 2–3.8 cm, otherwise similar to 3-foliolate leaves. Inflorescences axillary and sometimes basal to leaves, 0.8–6 × 0.8–1.7 cm; peduncle 0.1–2.5 cm; larger primary branches spreading or ascending. Pedicel 0.6–2 mm but 2.5–4 mm in fruit, sparsely hispidulous to pubescent. Sepals 1–2 mm, connate at base, outside hirsutulous or sparsely so or rarely nearly glabrous, persistent in fruit. Petals 2–3.5 mm,

Fl. China 11: 70–73. 2008.

persistent in fruit. Stamens 4, in male and bisexual flowers 1.5–2.5 mm, in female flowers 1.5–2 mm; filaments at least in male and bisexual flowers narrowly obtuse or sometimes acute at apex. Gynoecium glabrous, in female and bisexual flowers 1–1.5 mm, in male flowers ca. 0.3 mm. Fruit follicles obovoid,

5–8 mm, glabrous. Seeds ovoid, 4–5 mm, attachment Type B.
Fr. Aug.

Open forests; 500–700 m. S Yunnan [Laos, Myanmar, Thailand].

Fl. China 11: 70–73. 2008.