

7. TREMA Loureiro, Fl. Cochinch. 2: 539, 562. 1790.

山黄麻属 shan huang ma shu

Trees or large shrubs, evergreen. Branchlets never spinose, never corky or winged. Stipules 2, free, caducous, leaving a short transverse scar on each side of leaf base. Leaves alternate in several ranks; leaf blade ovate to narrowly lanceolate, margin denticulate; usually 3(-5)-veined from base (venation pinnate in *T. levigata*); secondary veins anastomosing before reaching margin. Inflorescences subsessile. Flowers unisexual or polygamous, shortly pedicellate. Male flowers: (4 or)5-lobed; tepals incurved, valvate, or ± imbricate. Stamens equal in number to tepals. Ovary rudimentary, basally with perigynous pubescence. Female flowers: (4 or)5-lobed. Ovary sessile, basally with perigynous pubescence. Drupes 1.5-5 mm in diam., erect, elliptic to ± globose; tepals and stigmas persistent or rarely perianth caducous; exocarp ± fleshy, endocarp bony. Endosperm fleshy; embryo curved or involute; cotyledons narrow.

About 15 species: tropical and subtropical areas; six species (two endemic) in China.

Trema species are often found in E and SW China, particularly in disturbed and degraded habitats.

- 1a. Leaf blade abaxially glabrous except for appressed hairs on major veins.
 - 2a. Perianth caducous in fruit; leaf blade elliptic-lanceolate to narrowly lanceolate, rarely 3-veined from base 1. *T. levigata*
 - 2b. Perianth persistent in fruit; leaf blade ovate, ovate-oblong, or rarely lanceolate (in *T. cannabina* var. *cannabina*), strongly 3-veined from base 6. *T. cannabina*
- 1b. Leaf blade abaxially pubescent over its whole surface.
 - 3a. Leaf blade 3-7 × 1-2 cm, abaxially densely white-tomentose, with inconspicuous rust-colored glandular hairs on veins, adaxially very scabrous; petiole 2-5 mm; male flower tepals densely hirsute inside 5. *T. angustifolia*
 - 3b. Leaf blade (5-)-7-22 × 1.5-9(-11) cm, adaxially ± smooth to ± scabrous, without rust-colored glandular hairs on veins; petiole 4-20 mm; male flower tepals not hirsute inside.
 - 4a. Leaf blade abaxially sparsely pubescent, usually with crowded minute dark red sessile glands; petiole 4-8 mm (in *T. cannabina* var. *dielsiana*) 6. *T. cannabina*
 - 4b. Leaf blade abaxially densely pubescent, not glandular; petiole 7-20 mm.
 - 5a. Leaf blade lanceolate to narrowly lanceolate, 1.5-4.5 cm wide; inflorescences shorter than petiole 4. *T. nitida*
 - 5b. Leaf blade ovate, ovate-oblong, or rarely broadly lanceolate, 3-9(-11) cm wide; inflorescences as long as or longer than petiole.
 - 6a. Plant to 10 m tall; fruit rounded-ovoid, 2-3 mm in diam.; leaf blade ± concolor, abaxially with grayish brown pubescence, surface of blade visible between hairs under magnification, adaxially very scabrous with erect bristles 2. *T. tomentosa*
 - 6b. Plant to 20 m tall; fruit ovoid-globose to ± globose, 3-5 mm in diam.; leaf blade grayish white to grayish green abaxially much paler than adaxially and pubescent, surface completely hidden by hairs, adaxially ± scabrous and usually rugate 3. *T. orientalis*

1. *Trema levigata* Handel-Mazzetti, Symb. Sin. 7: 107. 1929.

(Longlin), Guizhou, W Hubei, Sichuan, Yunnan.

羽脉山黄麻 yu mai shan huang ma

The fiber is used to make ropes and staple rayon.

Trees or shrubs, 4-7(-10) m. Branchlets covered with grayish white silky pubescence of loosely appressed hairs, with distinct ± rounded lenticels; old branchlets grayish brown. Stipules linear-lanceolate to filiform, 4-6 mm. Petiole 4-8 mm, with grayish white silky pubescence, hairs loosely appressed; leaf blade elliptic-lanceolate to narrowly lanceolate, 5-12 × 1.5-3 cm, papery, abaxially green and glabrous except for sparse silky pubescence on veins, adaxially dark green and nearly smooth or ± scabrous, base obtuse-rounded to ± cordate and symmetric or ± oblique, margin denticulate, apex acuminate; rarely 3-veined from base; secondary veins 3-5(-7) on each side of midvein, ± equally conspicuous. Cymes about as long as petiole. Male flowers: ca. 1 mm in diam.; tepals 5, obovate-navicular. Ovary rudimentary, narrowly obovate. Drupes reddish orange, black when mature, ± globose, compressed, 1.5-2.5 mm in diam.; perianth caducous. Fl. Apr-May, fr. Sep-Dec.

2. *Trema tomentosa* (Roxburgh) H. Hara, Fl. E. Himal., 2nd. Rep. 19. 1971.

山黄麻 shan huang ma

Celtis tomentosa Roxburgh, Fl. Ind., ed. 1832, 2: 66. 1832; *C. amboinensis* Willdenow, p.p.; *Sponia amboinensis* (Willdenow) Decaisne, p.p.; *S. tomentosa* (Roxburgh) Planchon; *S. velutina* Planchon; *Trema amboinensis* (Willdenow) Blume, p.p.; *T. dunniana* H. Léveillé; *T. velutina* (Planchon) Blume.

Trees or shrubs, to 10 m tall. Bark grayish brown, smooth or fissured. Branchlets grayish brown to brown, densely grayish brown to gray pubescent. Stipules linear-lanceolate, 6-9 mm. Petiole 0.7-1.8 cm, pubescent; leaf blade grayish brown to black-brown when dry, 7-15(-20) × 3-7(-8) cm, abaxially with grayish brown pubescence, surface of blade visible between hairs under magnification, adaxially very scabrous with erect bristles, base cordate and oblique, margin denticulate, apex acuminate, caudate-acuminate, or rarely acute; basally 3-veined;

• Forests, scrub on sunny mountain slopes; 100-2800 m. Guangxi

secondary veins 4 or 5 on each side of midvein. Male inflorescences 2–4.5 cm. Female inflorescences 1–2 cm. Male flowers: subsessile, 1.5–2 mm in diam. Ovary rudimentary, obovate-oblong, compressed, transparent. Female flowers: shortly pedicellate. Tepals 4 or 5, triangular-ovate, 1–1.5 mm. Ovary glabrous. Drupes brownish purple to blackish purple when mature, compressed, 2–3 mm in diam., irregularly rugate, glabrous; perianth persistent. Seed broadly ovoid, compressed, 1.5–2 mm, ribbed. Fl. Mar–Jun (but year-round in tropical zones), fr. Sep–Nov.

Forests, moist valleys, open slopes; 100–2000 m. S Fujian, Guangdong, Guangxi, Guizhou, Hainan, SW Sichuan, Taiwan, S Xizang, Yunnan [Bangladesh, Bhutan, Cambodia, Japan (Ryukyu Islands), Laos, Malaysia, Myanmar, Nepal, Pakistan, Sikkim, Vietnam; NE Australia, E Africa, Madagascar, Pacific Islands].

The pubescence of the leaves is very variable, and it is often difficult to distinguish *Trema tomentosum* and *T. orientalis*. Some authors have considered *T. tomentosum* to be a synonym of *T. orientalis*.

The wood is fine and strong, tannin is extracted from the bark, the fibers are used for manufacturing paper, ropes, and staple rayon, and the leaves are used as emery cloth.

3. *Trema orientalis* (Linnaeus) Blume, Mus. Bot. 2: 62. 1856.

异色山黄麻 yi se shan huang ma

Celtis orientalis Linnaeus, Sp. Pl. 2: 1044. 1753; *C. discolor* Brongniart; *C. rigida* Blume; *Sponia argentea* Planchon; *S. orientalis* (Linnaeus) Decaisne; *S. wightii* Planchon; *Trema polygama* Z. M. Wu & J. Y. Lin.

Trees or shrubs, to 20 m tall, d.b.h. to 80 cm. Bark gray, smooth, irregularly fissured on old branchlets. Branchlets grayish brown, pubescent. Stipules linear-lanceolate, 5–9 mm. Petiole 0.8–2 cm, pubescent; leaf blade 10–18(–22) × 5–9(–11) cm, leathery and fragile, abaxially grayish white to grayish green when dry, pubescent, and surface completely hidden by hairs, adaxially green to grayish green when dry, ± scabrous, and usually rugate, base cordate and oblique, margin denticulate, apex acuminate to acute; basally 3-veined; secondary veins 4–6 on each side of midvein. Male inflorescences 1.8–2.5(–3.5) cm, pubescent. Female inflorescences 1–2.5 cm. Male flowers: 1.5–2 mm in diam.; tepals 5. Ovary rudimentary, obovate-conic, ± compressed. Female flowers: pedicellate; tepals 4 or 5, triangular-ovate, 1–1.5 mm. Drupes black when mature, ± globose to ovoid-globose, ± compressed, 3–5 × 2.5–3.5 mm, rugose; perianth persistent. Seed broadly ovoid, ± compressed, 2–5 mm in diam. Fl. Mar–May(–Jun), fr. Jun–Nov.

Moist forests, dry scrub of open slopes; 400–1900 m. Fujian, SW Guangdong, W Guangxi, SW Guizhou, Hainan, Sichuan, Taiwan, Xizang, Yunnan [India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Sikkim, Sri Lanka, Thailand, Vietnam; Australia, Pacific Islands].

Trema polygama, described from Yunnan, differs in having the inflorescences shorter than the adjacent petioles.

4. *Trema nitida* C. J. Chen, Acta Phytotax. Sin. 17(1): 49. 1979.

银毛叶山黄麻 yin mao ye shan huang ma

Trees, 5–10 m tall, dioecious or monoecious. Branchlets brownish purple to grayish brown, with appressed grayish white pubescence. Stipules linear, 8–10 mm, pubescent, caducous. Petiole 0.8–2 cm, with adnate pubescence; leaf blade lanceolate to narrowly lanceolate, 7–15 × 1.5–4.5 cm, thinly papery, abaxially completely covered with silver gray to grayish yellow appressed shiny pubescence, adaxially dark green and smooth or ± scabrous, base ± rounded to rarely ± cordate and symmetric or ± oblique, margin denticulate, apex acuminate to acute; basally 3-veined; secondary veins 3–5 on each side of midvein. Cymes shorter than petiole; peduncles with adnate pubescence. Male flowers: ca. 1 mm in diam. Ovary rudimentary, apically sparsely pubescent. Female flowers: shortly pedicellate. Tepals 5, triangular-ovate. Drupes blackish purple when mature, ± globose to broadly ellipsoid, ± compressed, 2–3 mm in diam., glabrous; perianth persistent. Fl. Apr–Jul, fr. Aug–Nov.

• Moist forests on limestone slopes; 600–1800 m. Guangxi, W Guizhou, Sichuan, S Yunnan.

The wood is fine and strong, tannin is extracted from the bark, the fibers are used for manufacturing paper, ropes, and staple rayon, and the leaves are used as emery cloth.

5. *Trema angustifolia* (Planchon) Blume, Mus. Bot. 2: 58. 1856.

狭叶山黄麻 xia ye shan huang ma

Sponia angustifolia Planchon, Ann. Sci. Nat., Bot., sér. 3, 10: 326. 1848; *Celtis angustifolia* Lindley; *S. sampsonii* Hance; *Trema lanceolata* Merrill; *T. sampsonii* (Hance) Merrill & Chun.

Shrubs or small trees to 7 m tall, dioecious or monoecious. Branchlets slender, reddish purple, gray when dry, densely hirsute. Stipules filiform, to 3 mm. Petiole 2–5 mm, densely hirsute; leaf blade lanceolate to narrowly lanceolate, 3–7 × 1–2 cm, papery to somewhat leathery, abaxially grayish white when dry, surface completely hidden by tomentose hairs, and with inconspicuous rust-colored glandular hairs on veins, adaxially dark green, very scabrous, and blackening when dry, base rounded to rarely ± cordate, margin denticulate, apex acuminate to caudate-acuminate; basally 3-veined; secondary veins 2–5 on each side of midvein. Flowers unisexual, clustered in cymelets as long as or longer than petiole. Male flowers: subsessile, ca. 1 mm in diam.; tepals 5, narrowly ovate, incurved, inside densely hirsute. Drupes reddish orange when mature, ± compressed, 1.5–2.5 mm, rugate, glabrous; perianth persistent. Fl. Apr–Jun, fr. Aug–Nov.

Forests or scrub on sunny slopes; 100–1600 m. Guangdong, Guangxi, Hainan, S Yunnan [India, Indonesia, Malaysia, Thailand, Vietnam].

The fiber is used for manufacturing paper and textiles and the leaves are used as emery cloth.

6. *Trema cannabina* Loureiro, Fl. Cochinch. 2: 563. 1790.

光叶山黄麻 guang ye shan huang ma

Shrubs or small trees to 6 m tall, monoecious. Bark gray-

ish brown, smooth. Branchlets green, brown, or purplish, variously pubescent or glabrescent. Stipules linear-lanceolate, 2–5 mm. Petiole 4–8 mm, slender, variously pubescent; leaf blade yellow-green to brownish green or brown (never blackish) when dry, ovate, ovate-oblong, or rarely lanceolate, 4–9 × 1.5–4 cm, base rounded to ± cordate or rarely broadly cuneate, margin crenate-serrate, apex acuminate to caudate-acuminate; basally 3-veined; secondary veins 2 or 3 on each side of mid-vein. Male inflorescences usually in proximal leaf axil of branchlets. Female or androgynous inflorescences usually distal. Male flowers: pedicellate, ca. 1 mm in diam.; tepals 5, obovate. Drupes reddish orange when mature, ± compressed, 2–3 mm in diam.; perianth persistent. Fl. Mar–Jun, fr. Sep–Oct.

Sunny moist forests, scrub on sunny slopes, riversides, open places; 100–1100 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, S Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Cambodia, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam; Australia, Pacific Islands].

The fiber is used for manufacturing ropes and paper and the seed oil is used for soaps and lubricants.

- 1a. Leaf blade ± membranous, abaxially glabrous except for scattered tightly appressed hairs on main veins, adaxially ± smooth to ± scabrous; branchlets with appressed pubescence; cymes as long as or shorter than petiole; anthers without purple variegations 6a. var. *cannabina*
- 1b. Leaf blade thinly papery, abaxially sparsely pubescent, usually with crowded minute dark red sessile glands, adaxially scabrous; branchlets with spreading pubescence; cymes longer than petiole; tepals inside strigose; anthers with purple variegations 6b. var. *dielsiana*

6a. *Trema cannabina* var. *cannabina*

光叶山黄麻(原变种) *guang ye shan huang ma* (*yuan bian zhong*)

Celtis amboinensis Willdenow, p.p.; *C. virgata* Roxburgh ex Wallich; *Sponia amboinensis* (Willdenow) Decaisne, p.p.; *Sponia virgata* Planchon; *Trema amboinensis* (Willdenow) Blume, p.p.; *T. timorensis* Blume; *T. virgata* (Roxburgh ex Wallich) Blume.

Branchlets greenish yellow, with appressed pubescence, glabrescent. Petiole with appressed pubescence; leaf blade ± membranous, drying light yellow-green or yellow-brown, abaxially glabrous except for scattered tightly appressed hairs on main veins, adaxially ± smooth to ± scabrous. Cymes as long as or shorter than petiole. Tepals glabrous or sparsely tomentose.

Sunny moist forests, scrub on sunny slopes, riversides, open places; 100–600 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, SE Hunan, S Jiangxi, Sichuan, Taiwan, S Zhejiang [Cambodia, India, In-

donesia, Japan, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam; Australia, Pacific Islands].

6b. *Trema cannabina* var. *dielsiana* (Handel-Mazzetti) C. J. Chen, Acta Phytotax. Sin. 17(1) : 50. 1979.

山油麻 *shan you ma*

Trema dielsiana Handel-Mazzetti, Symb. Sin. 7: 106. 1929; *T. calcicola* S. X. Ren.

Branchlets reddish purple, brown with age, densely hirsute with obliquely spreading hairs. Petiole hirsute with obliquely spreading hairs; leaf blade thinly papery, abaxially sparsely pubescent, surface of blade visible between hairs, usually with crowded minute dark red sessile glands, adaxially green or brown when dry, scabrous. Male cymes longer than petiole. Male flowers: tepals ovate, inner surface strigose. Anthers with purple variegations.

- Scrub on sunny slopes; (100–)600–1100 m. Anhui (Dabie Shan), Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, S Jiangsu, Jiangxi, E Sichuan, Yunnan, Zhejiang.

