

7. SASSAFRAS J. Presl in Berchtold & J. Presl, Pfl. Rostlin 2(2): 30. 1825.

檫木属 cha mu shu

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Pseudosassafras Lecomte; *Yushunia* Kamikoti.

Deciduous trees, usually dioecious. Terminal buds large, operculate; bud scales suborbicular, densely sericeous. Leaves alternate, clustered at apex of branchlet, papery, pinninerved or triplinerved, dimorphic, unlobed or 2- or 3-lobed. Raceme terminal, few flowered, lax, pendulous, pedunculate, with late deciduous alternate bracts at base; bracts linear to filiform. Perianth yellow; perianth tube short; perianth lobes 6, in 2 series, subequal, deciduous at side above base. Flowers unisexual or bisexual, pedicellate. Male flowers: fertile stamens 9, inserted on throat of perianth tube, in 3 series, subequal; filaments filiform, longer than anthers, complanate, those of 1st and 2nd whorls eglandular but those of 3rd whorl each with 2 shortly stipitate glands; anthers ovoid-oblong, obtuse but always emarginate at apex, all 4-celled, upper 2 cells smaller, or sometimes anthers of 1st whorl 3-celled (upper cell infertile) or sometimes 2-celled (cells fertile), those of 2nd and 3rd whorls all 2-celled, cells all introrse or lower cells of 3rd whorl lateral, sometimes those of 3rd whorl extrorse; staminodes 3 or absent, if present in innermost whorl, alternate to stamens of 3rd whorl, triangular-subulate, stipitate. Female flowers: staminodes 6, in 2 series, or 12 in 4 series; ovary ovoid, almost estipitate and inserted in short perianth tube; style slender; stigma discoid-dilated. Fruit dark blue, drupaceous, ovoid, with a shallow perianth cup at base; stalk elongate, gradually dilated toward apex, glabrous. Seeds oblong, apiculate, coat thin; embryo subglobose, erect.

Three species: disjunctly distributed in China and North America; two species (both endemic) in China.

Chung, van der Werff and Peng (Observations on the floral morphology of *Sassafras randaiense* (Lauraceae), Ann. Missouri Bot. Gard., in press) found *S. randaiense* to have bisexual, protogynous flowers. Recent observations on flowers of *S. tzumu* (P. H. Raven, pers. comm.) suggest that this species also has bisexual flowers. Chung et al. (loc. cit.) also found that anthers of the 3rd whorl have extrorse rather than introrse cells.

In the phylogeny of the Lauraceae, unisexual flowers appear only three or four times: in *Hypodaphnis* Stapf, a unispecific genus from W Africa (basal in the family, and with an inferior ovary); in the *Litsea* group (*Actinodaphne*, *Litsea*, *Lindera*, and *Neolitsea*, together 400–500 species); in part of *Ocotea* Aublet and throughout both *Rhodostemonodaphne* Rohwer & Kubitzki and *Endlicheria* Nees (together about 300–400 neotropical species); and finally in one species of *Sassafras*. *Sassafras* is the only genus with species having unisexual and bisexual flowers. Molecular data indicate that *Sassafras* is close to the *Litsea* group but not part of it. One can avoid having species with unisexual and bisexual flowers in *Sassafras*; the two Chinese species are sister to the North American species (fide Nie et al., Pl. Syst. Evol. 267: 191–203. 2007), and one can split *Sassafras* into two genera, one with the North American species (with unisexual flowers), the other with the two Chinese species (with bisexual flowers). That would be in agreement with molecular data. One can also not split *Sassafras*, and that would be supported by molecular data as well.

The two Chinese species differ from the North American one in having perianth puberulent, male flowers each with 3 staminodes and 1 rudimentary pistil, and female flowers each with 12 staminodes.

- 1a. Leaf blade ovate or obovate, unlobed or 2- or 3-lobed; anthers of various whorls all 4-celled, upper 2 cells smaller 1. *S. tzumu*
- 1b. Leaf blade rhombic-ovate, those on infertile branchlets unlobed or 2- or 3-lobed, those on fertile branchlets unlobed; anthers of 1st whorl 3-celled (upper cell infertile) or 2-celled (cells all fertile) but those of 2nd and 3rd whorls all 2-celled 2. *S. randaiense*

1. *Sassafras tzumu* (Hemsley) Hemsley, Bull. Misc. Inform. Kew 1907: 55. 1907.

檫木 cha mu

Lindera tzumu Hemsley, J. Linn. Soc., Bot. 26: 392. 1891; *L. camphorata* H. Léveillé; *Litsea laxiflora* Hemsley; *Pseudosassafras laxiflorum* (Hemsley) Nakai; *P. tzumu* (Hemsley) Lecomte.

Deciduous trees, up to 35 m tall, 2–5 m d.b.h. Bark yellow-green when young but gray-brown when mature, smooth, irregularly and longitudinally fissured. Branchlets reddish initially but blackish when dry, robust, suberect, ± angled, glabrous. Terminal buds large, ellipsoid, up to 1.3 × 0.9 cm; bud scales suborbicular, densely yellow sericeous outside. Leaves alternate, clustered at apex of branchlet, unlobed or 2- or 3-lobed; petiole always reddish when fresh, slender, (1–)2–7 cm, plano-convex, glabrous or sparsely hirtellous; leaf blade gray-

green abaxially, green and opaque or slightly shiny adaxially, ovate or obovate, 9–18 × 6–10 cm, papery, glabrous on both surfaces or sometimes sparsely hirtellous especially on venation abaxially, pinninerved or triplinerved, basal lateral veins opposite, very developed, other lateral veins 5–7 pairs, midrib, lateral veins, and veinlets slightly conspicuous on both surfaces, lateral veins and veinlets anastomosing in arcuate form toward leaf margin, base cuneate, apex acuminate (but apex of lateral leaf lobes slightly obtuse). Raceme terminal, appearing before leaves, 4–5 cm, many flowered, pedunculate; peduncle less than 1 cm; rachis densely brown villous, subtended by late deciduous alternate involucral bracts at base; bracts linear to filiform, 1–8 mm, lowest one longest. Pedicel slender, 4.5–6 mm, densely brown villous. Flowers yellow, ca. 4 mm. Perianth tube very short; perianth lobes 6, lanceolate, subequal, ca. 3.5 mm, sparsely pilose outside, glabrous inside, slightly obtuse at apex. Fertile stamens 9, in 3 series, subequal, ca. 3 mm; filaments complanate, pilose; anthers ovate-oblong, 4-celled. Staminodes

3, ca. 1.5 mm, triangular-subulate, stipitate. Ovary ovoid, ca. 1 mm, glabrous; style ca. 1.2 mm; stigma discoid. Fruit subglobose, up to 8 mm in diam., blue-black and white waxy when mature, seated on red shallow perianth cup; stalk 1.5–2 cm, glabrous, gradually dilated at apex. Fl. Mar–Apr, fr. May–Sep.

• Always growing in sparse or dense forests; 100–1900 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Sichuan, Yunnan, Zhejiang.

The wood is yellowish, finely grained, durable, and used for boat and furniture-making. The roots and bark are used medicinally for treating traumatic injuries and rheumatic disorders. The fruits, leaves, and roots contain essential oil; the roots contain ca. 1%, and its main component is safrole.

2. *Sassafras randaiense* (Hayata) Rehder, J. Arnold Arbor. 1: 244. 1920.

台湾檫木 tai wan cha mu

Lindera randaiensis Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 257. 1911; *Pseudosassafras laxiflorum* (Hemsley) Nakai var. *randaiense* (Hayata) Nakai; *Yushunia randaiensis* (Hayata) Kamikoti.

Deciduous medium-sized trees, up to 70 cm d.b.h. Bark dark brown, longitudinally fissured. Branchlets robust, glabrous, red-brown when dry, lenticellate, with dense semilunar leaf scars. Leaves alternate, those on infertile branchlets unlobed or 2- or 3-lobed, those on fertile branchlets unlobed; petiole ca. 4 cm; leaf blade glaucous abaxially, green adaxially, rhombic-ovate, 10–15(–16) × 3–6(–7.5) cm, lateral veins 7 or 8 pairs, midrib conspicuous on both surfaces, basal lateral veins subparallel to leaf margin, arising from midrib at ca. 40°, base broadly cuneate, apex acute. Raceme terminal or subterminal, appearing before leaves, ca. 3 cm, pedunculate, 5 or 6 in umbel at apex of branchlet, each subtended by involucre bracts at base; involucre bracts 3 or 4, orbicular, ca. 1.5 cm, pubescent outside, late deciduous; bracts filiform-linear, ca. 1 cm, barbate. Pedicel ca. 6 mm. Perianth tube short, puberulent outside; perianth lobes 6, lanceolate-linear, subequal, ca. 4 × 1.25 mm, sparsely puberulent outside, glabrous inside. Fertile stamens 9, in 3 series, subequal; filaments complanate, those of 3rd whorl

each with 2 sessile glands at base; anthers ovoid-oblong, cells of 1st whorl 3, upper cell infertile, or 2, all fertile, those of 2nd and 3rd whorl 2. Staminodes of innermost whorl triangular-cordate or stamenlike, stipitate. Ovary obovoid, ca. 1 mm; style short, ca. 1 mm; stigma discoid. Fruit globose, ca. 6 mm in diam., seated on shallow perianth cup; stalk 2.5–3 cm, glabrous, gradually dilated toward apex.

• Evergreen broad-leaved forests; 900–2400 m. C and S Taiwan (Ali Shan).

