

SALICACEAE (M. Jacobs, Leyden)

1. SALIX

TOURN. *ex* LINNÉ, Sp. Pl. 2 (1753) 1015; Gen. Pl. ed. 5 (1754) 447; ANDERSSON, Kongl. Svenska Vet.-Ak. Handl. 6, 1 (1865) 1–180; in DC. Prod. 16² (1868) 191; PAX in E. & P. Pfl. Fam. 3, 1 (1889) 29.—Fig. 1, 3.

Dioecious trees or shrubs. Growth-mode in flushes. *Leaves* simple, spirally arranged, mostly elliptic to linear, often deciduous. Stipules mostly caducous, sometimes wanting. Catkins terminal, on short, caducous, axillary axes (bearing dwarfed leaves in Mal. *ssp.*). *Flowers* about spirally arranged along the rhachis of the catkin, each subtended by a membranous, entire bract. *Perianth* absent. *Disk* variable in shape, often consisting of 2 median lobules, or only one adaxial (in extra-Mal. *ssp.* rarely more in a whorl, or cupular). *Stamens* (1–)2–15, in Malaysian *ssp.* free or nearly so; anthers dehiscent longitudinally. *Ovary* more or less stipitate, 1-celled, consisting of 2 carpels; style more or less distinct, lobed. Ovules several, anatropous, basal, inserted amidst a mass of gradually developing, 1-celled hairs on 2 marginal placentas in the lower part of the ovary; the hairs arising both from the funicle and surrounding tissue. *Capsule* 2-valved, valves recurving. *Seeds* small, pushed out together with the hairs, without endosperm; testa thin.

Distr. About 300 *ssp.*, except a few tropical and subtropical ones, restricted to the temperate and cold zones of the N. hemisphere.

Note. The tropical to subtropical section *Humboldtianae* PAX to which *S. tetrasperma* belongs, is assumed to possess the most primitive structure in the genus.

KEY TO THE SPECIES

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| 1. Leaves elliptic-lanceolate, more than 2 cm broad, glandular-serrate. Bracts wholly haired. Stamens 4–15 | 1. <i>S. tetrasperma</i> |
| 1. Leaves lanceolate-linear, less than 1½ cm broad, finely serrate. Bracts haired only at the base. Stamens 2 | 2. <i>S. babylonica</i> |

1. *Salix tetrasperma* ROXB. Pl. Coast Corom. 1 (1795) 66, t. 97; BLUME, Bijdr. (1825) 516; WIGHT, Ic. 5 (1852) t. 1954; MIQ. Fl. Ind. Bat. 1, 2 (1859) 460; ANDERSSON, Kongl. Svenska Vet.-Ak. Handl. 6, 1 (1865) 1, f. 1; in DC. Prod. 16² (1868) 192; MIQ. Ill. Fl. Arch. Ind. (1870) 11; BRANDIS, For. Fl. (1874) 462, t. 58; F.-VILL. Nov. App. (1880) 210; HOOK. f. Fl. Br. Ind. 5 (1888) 626; KOORD. Exk. Fl. Java 2 (1912) 44; MERR. Sp. Blanc. (1918) 119; En. Philip. 2 (1923) 22; RIDL. Fl. Mal. Pen. 3 (1924) 393; JOCHEMS, Trop. Natuur 15 (1926) 200–203; CORNER, Wayside Trees (1940) 581, t. 175; BACK. Bekn. Fl. Java (em. ed.) 6a (1948) fam. 123.—*S. azaolana* BLANCO, Fl. Filip. ed. 2 (1845) 539; ed. 3, 3 (1879) 187, 188; MERR. Govt Lab. Publ. (Philip). 27 (1905) 81; Philip. J. Sc. 1 (1906) Suppl. 182.—*S. horsfieldiana* MIQ. Fl. Ind. Bat. 1, 2 (1859) 461; Suppl. (1861) 187, 474; ANDERSS. L.c. (1865) 3.—*S. zollingeriana* MIQ. *ex* ZOLL. Syst. Verz. 2 (1854) 108, *nom. nud.* (*zollingeri*); Fl. Ind. Bat. 1, 2 (1859) 462, *descr.*—*S. sumatrana* MIQ. Fl. Ind. Bat. Suppl. (1861) 187, 474.—*S. javanica* ANDERSS. L.c. (1865) 3.—*S. junghuhniana* ANDERSS. *ex* MIQ. Ill. Fl. Arch. Ind. (1870) 13.—Fig. 1, 3.

Evergreen or (in semi-arid climates) deciduous shrub or small to moderate-sized tree up to 25

by 1 m though generally smaller, branches more or less drooping. Young shoots nearly glabrous to rather densely greyish white-hairy, glabrescent. Stipules small, early caducous or wanting. *Leaves* (1½–)1–3(–4) cm petioled, elliptic to lanceolate, variable in shape but nearly always broadest just below or at the middle, (6–)8–16(–24) by (2–) 2½–4(–6) cm, herbaceous to subcoriaceous, glabrous or glabrescent, sometimes shining on the upper surface, seldom glaucous underneath, base narrowed to rounded, apex acute to acuminate, margin serrulate-denticulate, rarely subentire; the teeth bearing a minute, sessile, dark-coloured gland; midrib prominent, pale, lateral nerves numerous, distinct. *Catkins* on the twigs of the previous flush, upon short twigs (0–)½–2(–3) cm long and with 0–3(–5) caducous leaves, lax-flowered, the ♂ ones more or less pendulous, 4–12 cm long, the ♀ ones more straight, 3–10 cm long, in fruit somewhat longer; rhachis white-tomentose. ♂ *Flowers*: Bracts elliptic, 1–2(–3) mm long, concave, densely white-haired on both sides; apex rounded, seldom blunt; nerves 3, more or less distinct. Stamens free, 4–15, but on the same plant the variation in number is not beyond 3, sometimes different in length due to unequal development, 3–3½(–4) mm long in anthesis; filaments thin,



Fig. 1. *Salix tetrasperma* ROXB. a. Sterile twig, b. ♂ flowering twig, c. ♀ catkin, all $\times \frac{2}{3}$, d. 2 different ♀ flowers, $\times 18$, e. ♂ flower, $\times 18$, f. fruit, $\times 7$, g. acaroccedium on the leaf margin, h. leaf of a Philippine specimen, $\times \frac{2}{3}$.—i. *Salix babylonica* L., leaf.

sometimes sparsely white-haired at the base; anthers elliptic, small, yellow, glabrous. Disk fleshy, variously shaped, adaxial part $1\frac{1}{2}$ -1 mm long and wide, simple to bifid, abaxial part like a small scale adjoining the bract. ♀ *Flowers*: Bracts as in the ♂, caducous. Ovary \pm 1 mm stalked, conical with rounded base, 3-4 mm long, sometimes short-haired. Style distinct or not, more or less deeply 2-lobed. Disk as in the ♂ flower. *Fruit* 7 mm long; hairs white, silky, 5 mm long. *Seeds* 4, elliptic, 2 mm long, grey-blackish brown with lighter rhaphe, somewhat rough when dry, glabrous.

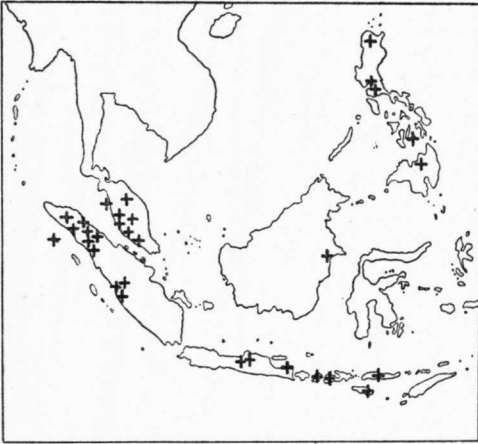


Fig. 2. Localities of *Salix tetrasperma* ROXB. in Malaysia.

Distr. Throughout SE. Asia, from Afghanistan and the Punjab (cultivated) eastwards through Burma, Siam, Indo-China to S. China (cult.?) (Yunnan, Kwangsi, Kwangtung) and Formosa, in *Malaysia*: N. and Central Sumatra, Simalur Isl., Malay Peninsula (introduced), the N. part of Central and E. Java, the Lesser Sunda Islands (Lombok, Sumbawa, Sumba, Flores), E. Borneo [*pr.* Samarinda, near Bungalun River, 10 m alt., RUTTEN 719 (U) ♀], Philippines (Luzon, Bohol, Mindanao). Fig. 2.

In the Malay Peninsula only ♂ specimens have been found and it is assumed to have been introduced there; this may have been the case in some other localities.

Ecol. Along water-courses, riverbanks, fringing streamsides and banks of pools and lakes, mostly in the lowlands, ascending in the Himalayas to 2100 m, in Sumatra to 1500 m (fig. 3), and in the Philippines to medium altitudes. Flowers are found throughout the year; the secreted honey attracts insect-visitors.

Dispersal of seeds is partly performed through the air as seeds adhere to the woolly hair-flakes which facilitate airborne dispersal. Buoyancy power of seeds seems to be short, according to RIDLEY (Disp. 226). Vegetative dispersal is by water.

Two kinds of galls have been reported by VAN

DER MEER MOHR (Bull. Jard. Bot. Btzg III, 8, 1926, 114-115, t. 18) and by DOCTERS VAN LEEUWEN (Ned. Kruidk. Arch. 51, 1941, 133), viz an acarococcid (fig. 1g) caused by Eriophyidae, causing swollen, recurved, hairy, pale green later pink leaf-margin galls (in Sumatra and Malaya), and a dipterococcid, caused by Cecidomyiidae, slightly deforming the ♂ catkins with inflated filaments (in Sumatra).

Wood anat. PEARSON & BROWN, Comm. Timb. India 2 (1932) 1012; REYES, Commonwealth Philip. Dept Agric. Techn. Bull. 7 (1938) 54.

Uses. In Malaya planted on the dikes of the rice-fields, and by Chinese on embankments of tanks and mines, apparently for protecting the soil, according to BURKILL found in every village in some of the northern parts of the Peninsula. It is also sometimes pollarded for forming fences. Propagation is easy by cuttings. It is said to be used against fever; as a matter of fact the crystalline glucosid, salicin, occurs in many *Salix* and is a febrifuge. According to BURKILL & HANIFF (Gard. Bull. Str. Settl. 6, 1930, 254) a decoction is used cold for ulceration of the nose. Apparently, no one has yet examined the bark for salicin.

None of the uses mentioned above have been reported from Java and none is definitely known from the Philippines (*cf.* QUISUMBING, Med. Pl. Philip. 1951, 220). In the latter islands the timber is stated to be occasionally used for house-building purposes.

Vern. *Kapeh kapeh, api api, S, dēdalu, dalu dalu, S, M, gēndalu, nalu ayēr, jēndalu, mē(n)dalu, M, anjang anjang, assang, J, kad(d)ju anjang, J, Md; Philippines: libās, malatiki, tiāun, Tag., mak-sa, C. Bis.*

Note. The Philippine specimens are remarkably uniform and characterized by long-petioled, elliptic-oblong, shining, acuminate leaves (tip c. 1 cm); midrib fulvous, nerves distinctly prominent; shoots and leaves already glabrous when young (fig. 1h). However, the flowers show no difference from other *tetrasperma* and similar specimens have been found in Sumatra and Malaya, connected by transitional forms with the common type.

2. *Salix babylonica* LINNÉ, Sp. Pl. 2 (1753) 1017; ANDERSSON, Kongl. Svenska Vet.-Ak. Handl. 6¹ (1865) 50, f. 32; MIQ. Ill. Fl. Arch. Ind. (1870) 14; BRANDIS, For. Fl. (1874) 465, t. 59; BACK, Bekn. Fl. Java (em. ed.) 6a (1948) fam. 123.—*S. chinensis* BURMAN f. Fl. Ind. (1768) 211 (*err. typ.* 311); MERR. Philip. J. Sc. 19 (1921) 345.—*S. japonica* (an THUNB.?) BLUME, Bijdr. (1825) 516; KOORD. Exk. Fl. Java 2 (1912) 44.—*S. pendula* (an MOENCH.?) K. KOCH, Dendrologie 2 (1872) 507 *pro stirp. mal.*—Fig. 1i.

Tree or shrub with mostly drooping, reddish branches. Twigs when young pilose, later glabrous, and when older with distinct, acute, axillary buds. *Leaves* 2-5 mm petioled, linear-lanceolate, 6-12 by $1\frac{1}{2}$ -1 $\frac{1}{4}$ -(2 $\frac{1}{4}$) cm, shiny above, glaucous or dull green below, base blunt, apex acute, margin finely serrate; midrib prominent, whitish. *Catkins* short, on twigs of the previous flush, terminal on



Fig. 3. *Salix tetrasperma* ROXB. along a stream in Sumatra East Coast (JOCHEMS).

short shoots with a few, small, entire leaves. Rhachis short-haired, rather dense-flowered. ♂ *Flowers*: Bracts thin, ovate-elliptic, 1½ mm long, with 3 distinct nerves and cucullate top, white-villous only at the base. Stamens 2, connate at the very base, 4–4½ mm long; filaments filiform, somewhat haired at the base; anthers small. Disk not very fleshy, adaxial part about as large as the abaxial part, elliptic, 2–3 times as short as the bract. ♀ *Flowers* (not found in Malaysia): Bracts acute, 2–2½ mm, only at the base vaulted and haired. Ovary nearly sessile, conical, not or somewhat longer than the bract, glabrous, with a distinct, 4-lobed style. Disk only adaxial, flat, 1 mm long.

Distr. Possibly wild in Persia, China, Japan, and widely cultivated in S. and Central Europe, SW. and S. Asia, the Himalaya, in *Malaysia*: only cultivated in the Malay Peninsula (*cf.* note below), in Java (Priangan, Diëng), and the Philippines (Luzon, one sterile specimen).

Ecol. In Java cultivated since a long time, first recorded by BURMAN in 1768 (after a specimen received from KLEYNHOFF in 1759, preserved at Geneva)¹; 1000–2200 m, only ♂ plants; *fl.* throughout the year.

(1) An other specimen of herb. BURMAN (L), cultivated in Java, wrongly identified as *S. babylonica* or *S. japonica*, appeared to be *Spiraea thunbergii* STEB.

Vern. *Tjemeten, tjumeti, J.*

Note. The identity of *Salix sp.* mentioned by CORNER in his *Wayside Trees* 1 (1940) 581 as to be cultivated in gardens in the Malay Peninsula, is not certain. CORNER himself suspects that it is *S. babylonica*.

Excluded

Populus deglubata REINW. *ex* BLUME, *Mus. Bot.* 1 (1849) 83 *in syn.* = *Eucalyptus deglupta* BL.

Salix urophylla LINDL. *ex* ANDERSSON, *Act. Acad. Reg. Scient. Holm.* (1850) 487 is according to HOOKER (*Fl. Br. Ind.* 5, 1888, 637) based on a WALLICH specimen (Cat. 3708), incomplete and worthless for any identification. ANDERSSON (*Kongl. Svenska Vet.-Ak. Handl.* 6¹, 1867, 5) refers to this species the specimen ZOLLINGER 2927 from E. Java, which MIQUEL had already described as *S. zollingeriana*, here reduced to *S. tetrasperma*.

'*Salix calophylla* WALL.' A specimen under this name in *Herb. Kew*, said to have been collected by GRIFFITH and labelled 'Malacca' is according to RIDLEY (*Fl. Mal. Pen.* 3, 1924, 393) utterly unlike the Malayan *Salices* and has doubtless wrongly been localized.