

## BIXACEAE<sup>1</sup> (C. A. Backer, Heemstede)

### 1. BIXA

LINNÉ, Sp. Pl. (1753) 512; Gen. Pl. ed. 5 (1754) no 581.

Small trees or erect shrubs. *Leaves* spirally arranged, simple, petioled, entire, palmatinerved, densely red-dotted. Stipules small, very caducous. *Flowers* in terminal corymbs or panicles, actinomorphic, ♀, rather large. Pedicel with 5–6 apical glands. Sepals 4–5, free, imbricate in bud, falling off as soon as the flower expands. Petals 4–7, free, imbricate in bud. Stamens numerous, inserted on an annular hypogynous disk; filaments thin, free; anthers horseshoe-shaped, passing over the top of the filament and with both ends closely applied to it, 2-celled; cells opening in the middle (on the top of the filament) by short slits which unite into a spuriously apical pore. *Ovary* superior, usually bristly, 1-celled, with 2 opposite parietal slightly intruding placentas. Style 1, sinuous, rather thick; stigma 2-dentate. Ovules very numerous. *Capsule* compressed contrary to the placentas, usually softly prickly, rarely smooth, loculicidally bivalved; endocarp membranous, separating from the valves. Seeds numerous, obovoid, angular; testa fleshy, very densely studded with small, round, red, sessile glands; albumen well-developed, not oil-containing; embryo rather large.

Distr. Monotypic, native and cultivated in tropical America; cultivated in many other tropical countries.

Ecol., Uses. See beneath under *Bixa orellana*.

1. *Bixa orellana* LINNÉ, Sp. Pl. (1753) 512; BURM. f. Fl. Ind. (1768) 120; DC. Prod. 1 (1824) 259; BLUME, Bijdr. (1825) 56, 100; BLANCO, Fl. Fil. (1837) 456; ed. 2 (1845) 317; ed. 3 (1878) 221, t. 231; MOR. Syst. Verz. (1945/46) 34; CLOS, Ann. Sc. Nat. (1857) 260; MIQ. Fl. Ind. Bat. 1, 2 (1859) 108; HOOK. f. Fl. Br. Ind. 1 (1872) 190; KING, Mat. Fl. Mal. Pen. 1 (1890) 54; GRESH. Nutt. Pl. (1894–1900) 49, t. XIV; KOORD. Minah. (1898) 344; K. & V. Bijdr. 5 (1900) 32; K. SCH. & LAUT. Fl. Deut. Sch. Geb. (1901) 451; BECC. Nelle For. (1902) 594; BACK. Fl. Bat. 1 (1907) 62; Schoolfl. (1911) 69; KOORD. Exk. Fl. 2 (1912) 624; MERR. Fl. Man. (1912) 333; Interpr. (1917) 376; Sp. Blanc. (1918) 274; En. Born. (1921) 410; En. Philip. 3 (1923) 103; RIDL. Fl. Mal. Pen. 1 (1922) 252; BACK. & SLOOT. Theekonkr. (1924) 176, t. 176; HEYNE, Nutt. Pl. (1927) 1132; BURK. Dict. 1 (1935) 330; BACK. Bekn. Fl. Java, em. ed. 4 (1942) fam. 82, 1; STEEN. Fl. Sch. Indon. (1949) 282.—*Pigmentaria* RUMPH. Herb. Amb. 2 (1741) 79, t. 19.—*Rocu* SONNERAT, Voy. Nouv. Guin. (1776) 29, t. 13.—Fig. 1–2.

Shrub or small tree, 2–8 m high; bark dark-brown, tough; young branchlets densely rusty-scaly, glabrescent. Stipules oblong, acute, 6–10 mm long. Leaves herbaceous, ovate from a shallowly cordate, less often truncate base, gradually long-acuminate, at first densely scaly beneath, glabrescent, very densely red-dotted, 7½–24 by 4–16 cm; 5-nerved; lateral nerves on each side of midrib several, connected by numerous transverse nerves; jarger nerves prominent beneath; petiole terete,

thickened at base and apex, at first densely scaly, glabrescent, 4½–12 cm long. *Panicles* or corymbs 8–50-flowered; bracts early caducous, 5–10 mm long. Pedicel terete or subcompressed, thick, densely red-squamosely, 8–10 mm long, much thickened at the apex and bearing there 5–6 large, sessile, shining glands alternating with the sepals. Flowers 4–6 cm across. Sepals obovate, concave, obtuse, purple, densely rusty-scaly, 10–12 mm long. *Petals* 5–7, unequal, obovate, obtuse or retuse, light red, veined, 2–3 by 1–2 cm, on the back with many oblong dots, deciduous. Disk ± 1 mm high. *Filaments* at the base yellow with a few dots, at the apex red; anthers violet; ovary subglobose, densely clothed with red-blotched bristles, 2½–3½ mm high. Style thickened upwards, 12–15 mm long; stigmatic teeth very short. Ovules red-dotted. *Capsule* from a subtruncate base either broadly ovate, with a broadly rounded abruptly and shortly acuminate apex (so in most Indonesian specimens) or elongate-ovate with a much narrowed, rather long-acuminate apex, 2–4 cm long, 2–3½ cm wide, more or less densely clothed with long, filiform thickish, very acute, stiffish but not sharp, in a dry state very brittle bristles, at first red, afterwards greenish, finally brown, opening down to the base by two persistent valves; funicles rather long with a disciform apex. Seeds 4–5 mm long.

Distr. Frequently cultivated throughout *Malaysia* but no specimens as yet seen from the Lesser Sunda Islands. I never saw an indisputably wild specimen.

(1) In this Flora *Bixaceae* are treated as a monogeneric family.

Ecol. In Java specially in the W. and Central parts, up to ca 2000 m, in living fences and along road-sides, sometimes on premises, rarely in small plantations.

Uses. Formerly frequently used as a wind-break in tea plantations but as such fallen into disuse because of its liability to be attacked by *Helopeltis*.

The form mostly cultivated in Indonesia is the inferior one with broad-topped shortly acuminate fruit (see above); the much superior variety with elongate-ovoid, long-acuminate fruits has been collected only here and there in Java. Both forms

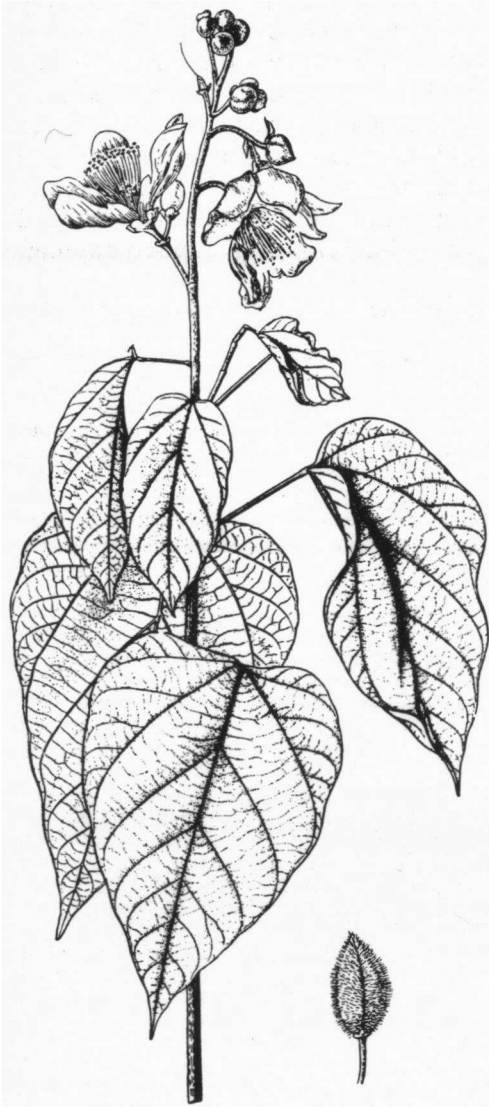


Fig. 1. *Bixa orellana* L. Flowering branch and separate fruit.

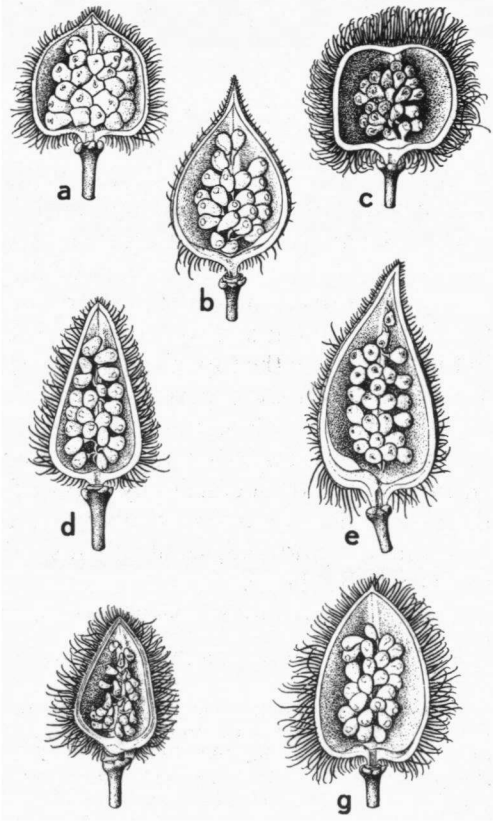


Fig. 2. Some halved fruit of forms of *Bixa orellana* L. at Bogor. a-c. white fruits, d-g. red fruits.—a. hairs brown, fruit yellow-green (V. ii. 8), b. hairs and fruit green (V. ii. 6), c. ditto (in hedge of Bot. Gard.), d. hairs red, fruit greenish (V. iii), e. hairs red, fruit green with red apex (V. ii. 2), f. fruit and hairs red (iv. F. 88a), g. fruit green, hairs red (M. iv. 1). Compiled by EYMA; between brackets number in Bot. Gard. Bogor; all  $\times \frac{1}{2}$ .

are at present economically unimportant. In the Botanic Gardens and Economic Gardens at Bogor many forms are cultivated with different fruit-shapes, in which the late Dr EYMA could distinguish the forms depicted in fig. 2.

A dye (*anatto*) is prepared from the outer coat of the seeds. This dye was formerly used for the colouring of fabrics but this use has gone out as the colour is not durable; anatto has since long been superseded by aniline dyes. At present it is still used for the colouring of butter and cheese. The leaves are sometimes used medicinally for treating fever in children.

Wood anat. VESTAL, Philip. J. Sc. 64 (1937) 222. RECORD & HESS, Timb. New World (1947) 89. METCALFE & CHALK, Anat. Dic. 1 (1950) 106 (fig.). Vern. *Kasumba* (with many variants and addi-

tions), M, sometimes with the addition *kéling*, which points to introduction from the south of Hindustan (Coromandel, Malabar), or, in a broader sense, from overseas, *galinggém*, *galuga*, S, *barada* (Bugin), *satumbal* (Sumatra), *parada* (Celebes), *djabé bang* (Borneo) and some local names. Philippines: *Achuéte* (general), *achiti*, *a(t)suite* (Ilk.), *achóte*, *asúti*, *atseuète* (Tag.), *achoète* (Tagb.),

*apatut* (Gad.), *chanang*, *janang* (Sul.), *chótes*, *sotis* (Bis.).

Note. The late Dr P. J. EYMA made a survey of forms represented at Bogor, noting the shape of the fruit, its colour, the colour and length of the bristles on it, and the colour of the corolla. He found no less than 18 combinations, some of which have been pictured in fig. 2.