

FLORA DA RESERVA DUCKE, AMAZONAS, BRASIL: ERYTHROXYLACEAE

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Schulz, O. E. 1907. Erythroxylaceae. *In*: A. Engler (ed.). *Das Pflanzenreich* 4(134): 1-176.

Plowman, T. 1989. Erythroxylaceae. *In*: G. Harling & L. Andersson (eds.). *Flora of Ecuador* 36: 1-32.

Shrubs and **small trees**. **Leaves** alternate, glabrous, entire, petiolate. Stipules present, often large and persistent on twigs or caducous. **Flowers** hermaphrodite, borne solitary or in axillary fascicles, arising from the axils of small scarious bracteoles, pedicellate, actinomorphic, often heterostylous. Calyx lobes 5, valvate. Petals 5, free, alternate with sepals, imbricate in bud, usually with appendages on adaxial surface. Stamens 10, united at base to form a short tube; anthers longitudinally dehiscent. Ovary superior, 3(-2) locular, usually with only one locule developing, one ovule per loculus, pendulous, epitropous; styles 3(-2) free or connate at base; stigmas capitate. **Fruit** of small one-seeded drupes, with or without endosperm.

The family consists of 4 genera and about 260 species. Three genera are confined to tropical Africa and *Erythroxylum*, with 250 species, occurs in the Neotropics, Africa, Asia and Australia. Three species of *Erythroxylum* are known to occur in the Reserva Ducke.

The family is best known for the species *Erythroxylum coca* Lam., the source of cocaine. This is mainly a highland species of the Andean montane forest, but the lowland variety *ipadu* is cultivated by tribes in western Amazonia.

The family is closely related to the Linaceae and the Humiriaceae.

1. *Erythroxylum*

Erythroxylum P. Browne, *Civ. Nat. Hist. Jamaica* 1: 278. 1756.

Glabrous **shrubs** or **small trees**. Twigs compressed at apex and often bearing persistent, distichous, imbricated cataphylls and foliar stipules. Stipules intrapetiolar, bicarinate, often setulose at apex, persistent or caducous. **Leaves** entire, petiolate. **Flowers** small, solitary or in fascicles, arising from axils of persistent, small, scarious, cymbiform bracteoles, pedicellate, actinomorphic, heterostylous (and rarely unisexual). Petals with appendages on adaxial surface and with a 2-lobed ligule. Stamens 10, borne in two whorls of 5, the outermost alternating with the petals, the filaments united at base to form a short tube which surrounds the ovary. Ovary 3-locular, but with the single ovule in only one loculus, pendulous, anatropous, epitropous; styles 3, free or partly connate at base; stigmas capitate. **Fruit** a small, fleshy, single-seeded drupe.

Type species: *Erythroxylum areolatum* L.

Key to the species of *Erythroxylum* in Reserva Ducke

1. Stipules 8–30 mm long, tapering to a long point, usually persistent.
 2. Leaf laminas 15–26 cm long, stipules caducous and not fraying; calyx 4–6 mm long, the margins of lobes overlapping or touching at anthesis 2. *E. macrophyllum*
 2. Leaf laminas 5.5–13 cm long, stipules persistent, becoming frayed and paleaceous; calyx 2 mm long, the margins of lobes not touching or overlapping 3. *E. mucronatum*
1. Stipules obtuse, 3–5 mm long, caducous 1. *E. citrifolium*

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1.1 *Erythroxylum citrifolium* A. St.-Hil., Fl. bras. Mer.: 94. 1829.

Erythroxylum acutifolium Steud. ex Peyr., in Mart. Fl. bras. 12(1): 164. 1878.

Erythroxylum micranthum Bong. ex Peyr., in Mart. Fl. bras. 12(1):

Erythroxylum paraensis Peyr., in Mart. Fl. bras. 12(1): 164. 1878.

Erythroxylum duckei Huber, Bol. Mus. Goeldi 5: 416. 1909.

Erythroxylum micranthum Bong. ex Peyr., in Mart. Fl. bras. 12(1): 164. 1878.

Shrub or **tree** to 15 m tall; twigs smooth, with dark reddish to grey-brown bark. Cataphylls 5–7, scattered at base of shoots, caducous. **Leaf** laminas oblong-elliptic 7–14 × 2.5–4.5 cm, acuminate at apex, the acumen 2–10 mm long, subcuneate at base, subcoriaceous, glabrous on both surfaces; midrib prominent on both surfaces, the secondary nerves obscure above, prominulous beneath; petioles 4–6 mm long. Stipules 3–5 mm long, oblong-lanceolate, membranaceous, densely longitudinally striate-nerved, caducous. Bracteoles 0.5–2 mm long, lightly striate-nerved, acute or obtuse at apex. **Flowers** hermaphrodite, numerous in axils of leaves or cataphylls on mature twigs; pedicels 3–5 mm long, 5-ribbed. Calyx *ca.* 1.5 mm long, the lobes triangular to ovate-lanceolate. Staminal tube ½ as long to equalling calyx lobes, ± 1 mm long, filaments ± 2.5 mm long. **Drupe** 7–13 mm long, oblong, 4–5 mm diam., red. **Type:** *St. Hilare* 755, Brazil, Goiás, Villa Boa, fl (holotype, P; isotypes, MPU P).

A widespread species from Nicaragua and Panama to Southeastern Brazil also in the Guianas, Peru and Ecuador.

28.IX.1995 (fl) *Sothers, C. A. & Pereira, E. C.* 584 (INPA K MG MO NY RB SP U UB); 6.XII.1995 (fr) *Sothers, C. A. & Pereira, E. C.* 693 (BM G IAN INPA K MBM SPF UEC US); 22.II.1996 (fr) *Sothers, C. A. et al.* 796 (IAN INPA K MO NY RB SP U UB).

1.2 *Erythroxylum macrophyllum* Cav., Diss.: 401, t. 227. 1789.

Erythroxylum floribundum Mart., Beitr. Erythroxylon: 118. 1840.

Erythroxylum amplum Benth., London J. Bot. 2: 372. 1843.

Erythroxylum filipes Huber, Bol. Mus. Goeldi 5: 415. 109.

Shrub or **small tree** to 12 m tall; twigs with greyish bark. Cataphylls 4–10, scattered at base of new shoots similar to stipules. **Leaf** laminas oblong to oblong-elliptic, 15–20 × 5–12 cm, acuminate at apex, the acumen 5–10 mm long, cuneate at base, coriaceous, glabrous on both surfaces, drying ferruginous beneath; midrib prominulous above, prominent beneath, secondary nerves prominulous on both surfaces; petioles 8–12 mm long. Stipules 8–20 mm long, lanceolate, tapered at apex to an acute point, often 2–3 setulose, longitudinally striate, scarious-membranaceous. Bracteoles persistent, 2–3 mm long, striate-nerved, acuminate, 1-setulose. **Flowers** hermaphrodite, numerous in axils of leaves or cataphylls; pedicels 4–12 mm long, 5-ribbed. Calyx 4–6 mm long, the lobes ovate to oblong-ovate, abruptly acuminate at apex. Staminal tube less than half length of calyx-lobes. **Drupe** 10–11 × 4.5–5.5 mm, red.

Type: *Stoupy s.n.*, French Guiana (holotype, MA).

A widespread species from Mexico to Bolivia and throughout the Guianas and Amazonia.

15.XI.1995 (fr) *Assunção, P. A. C. L. & Souza, M. A. D.* 250 (INPA K MG MO NY RB SP U UB); 15.XII.1995 (bd) *Assunção, P. A. C. L.* 297 (INPA K MG NY); 15.XII.1995 (bd) *Assunção, P. A. C. L.* 298 (INPA K MO); 18.XII.1975 (fr) *Coêlho, D.* 733 (INPA); 19.I.1990 (fr) *Gentry, A. H. & Nelson, B. W.* 69306 (INPA); 8.XII.1994 (fl) *Hopkins, M. J. G. et al.* 1512 (INPA K MG NY); 29.XI.1976 (fl) *Lisboa,*

P. 855 (INPA); 28.XI.1994 (fl) Nascimento, J. R. & Silva, C. F. 668 (G IAN INPA K NY RB SP U UFMT US); 13.XII.1963 (fl) Rodrigues, W. & Coêlho, D. 5601 (INPA); 3.I.1964 (fl) Rodrigues, W. & Monteiro, O.P. 5656 (INPA); 27.III.1995 (fr) Sothers, C. A. & Vicentini, A. 372 (INPA); 12.X.1995 (fr) Sothers, C. A. & Pereira, E. C. 626 (BM G INPA K MBM MG SPF UEC US); 15.I.1996 (fr) Sothers, C. A. 724 (INPA K); 21.XI.1997 (fl) Sothers, C. A. & Assunção, P. A. C. L. 1048 (B GH IAN INPA K UEC); 8.II.1995 (fl) Vicentini, A. et al. 856 (COL F INPA K MBM MG NY SPF UB VEN); 18.IX.1995 (fl) Vicentini, A. & Silva, C. F. 1030 (BM INPA K).

1.3 *Erythroxylum mucronatum* Benth., London J. Bot. 2: 372. 1843.

Erythroxylum kirkianum O. E. Schulz, Fedde's Repert. Spec. Nov. Regni Veg. 30: 179. 1932.

Erythroxylum albertianum Kuhlmann & Rodrigues, Publ. Inst. Nac. Pesq. Amaz. Bot. 5: 3. 1957.

Shrub or **small tree** to 15 m tall; twigs with reddish brown or dark brown bark. Cataphylls 4–5, scattered at base of shoots, similar to stipules. **Leaf** laminas elliptic to oblong-elliptic, 5.5–13 × 2–5 cm, finely acuminate at apex, the acumen 8–12 mm long, cuneate at base, subcoriaceous, glabrous on both surfaces; midrib prominulous above, prominent

beneath; secondary nerves prominulous on both surfaces; petioles 2–5 mm long. Stipules 10–30 mm long, persistent, lanceolate, tapered to apex to an acute point, usually 3-setulose, the setae finely filamentous, longitudinally striate, scarious-membranaceous. Bracteoles 1–2.5 mm long, acuminate at apex, 1-setulose, striate-nerved. **Flowers** hermaphrodite, numerous in axils of leaves or cataphylls; pedicels 2–5 mm long, 5-ribbed. Calyx ca. 2 mm long, the lobes narrowly triangular to ovate, acuminate at apex. Staminal tube $\frac{1}{2}$ – $\frac{3}{4}$ as long as calyx lobes. **Drupe** 12–14 × 4–5 mm, red when mature, when immature drying subclavate.

Type: Schomburgk 766, Guyana, Potaro River, fl (holotype, K; isotypes, BM CGE K NY P W).

A widespread species from Colombia to the Guianas, Amazonia, Peru, Ecuador, Bolivia.

29.IX.1995 (fl) Sothers, C. A. et al. 589 (COL F INPA K MG PUEFR UFMT VEN VIC); 6.XII.1995 (fr) Sothers, C. A. & Pereira, E. C. 695 (BM G IAN INPA K MBM UB UEC US); 5.V.1995 (fr) Vicentini, A. et al. 949 (IAN INPA K MO NY RB SP U UEC); 6.IX.1995 (fl) Vicentini, A. et al. 1023 (IAN INPA K MO NY RB SP U UB); 18.IX.1995 (fl) Vicentini, A. & Silva, C. F. 1029 (G INPA K MBM MG UEC US); 18.X.1995 (fl) Vicentini, A. & Silva, C. F. 1087 (BM INPA K MG SPF).