

GUIDE TO THE GENERA OF LIANAS AND CLIMBING PLANTS IN THE NEOTROPICS

DIOSCOREACEAE

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Dioscorea alata Chodat, photo by P. Acevedo

A primarily tropical family extending to warm temperate regions with 3 genera and about 800 species of twining, rhizomatous vines or lianas, most of which belong to the genus *Dioscorea*. Dioscoreaceae is represented in the New World only by *Dioscorea* with a total of about 400 species, 371 of which are found in the Neotropics. For the most part, they are found in moist, wet or seasonal lowland forest.

Diagnostics: Twining lianas or vines, commonly with large tubers; most species with cylindrical stems, < 2 cm in diameter; cross section with a distinctive atactostele, i.e., distinct, scattered, collateral vascular bundles; leaves simple to deeply lobed, alternate to opposite, with long petioles.

General appearance like some Menispermaceae but distinguished by the herbaceous to slightly woody stems with an atactostele, presence of stipules, and the capsular fruits or samaras. *Dioscorea* species with alternate leaves are sometimes confused with *Smilax*, but the latter climbs by means of tendrils, not by twining.

General Characters

1. **STEMS.** Herbaceous to slightly woody, cylindrical, trigonous, quadrangular, winged, smooth or armed with prickles, known to reach up to 10-15 m in length and in some species up to 3 cm in diam. All species have an *atactostele* with collateral vascular bundles scattered in the ground tissue, irregularly so in some species (fig. 1a & b). Vessel elements may be very wide and visible to the naked eye (fig. 1a & b).
2. **EXUDATES.** Watery or no visible exudate.
3. **CLIMBING MECHANISMS.** All species are *twiners* with species twining either clockwise or counterclockwise.
4. **LEAVES.** Alternate, sub-opposite or opposite, membranaceous or chartaceous, simple, commonly cordiform, less often trilobed or linear, palmately lobed or palmately compound, commonly with 3-7(14) main arcuate, parallel veins from base, margins entire. Petioles commonly long and pulvinate on both ends; sometimes persistent as a spine after shedding of the blade. Stipules often present as an auricle or spine at the petiole base.
5. **TUBERS & BULBILS.** Most species produce subterranean small to large tubers and axillary, starchy bulbils.
6. **INFLORESCENCE.** Axillary or sometimes the staminate inflorescences terminal and paniculate thyrses; axillary inflorescences spreading to pendent, spikes, racemes or thyrses; flowers subtended by a bract and a bracteole.
7. **PEDICELS.** Absent or short.
8. **FLOWERS.** Unisexual (the plant often dioecious), actinomorphic or rarely zygomorphic, commonly up to 4 mm long; perianth of 6 distinct or connate tepals in two whorls. Staminate flowers with 6 stamens or sometimes 3 stamens and 3 staminodia, the filaments free, or connate to various degrees, the anthers opening through longitudinal slits; pistillode sometimes present. Pistillate flowers with hypanthium; staminodia sometimes present; ovary inferior, tricarpellate with 1-4 axial ovules per locule, the styles 3, free or connate at base, the stigma 3 or 6.
9. **FRUIT.** Trilocular loculicidal, marginicidal, dry or less often fleshy *capsules* with 2-4 seeds per locule, or a *samara* with a single seed.



Figure 1. A & B. Cross sections of stems in 2 species of *Dioscorea*, showing collateral vascular bundles some of which have xylem with wide vessels. C. Petiole with geniculate base and stipular thorns of *Dioscorea* sp. D. Square, 4-winged stem of *Dioscorea* sp. Photos by P. Acevedo.



Figure 2. **A.** Woody tuberous base of *Dioscorea mexicana*. **B.** Aerial starchy bulbil of *Dioscorea alata*. Photos by P. Acevedo.



Figure 3. Leaf features in *Dioscorea*. **A.** Cordate blade with 9 main, arcuate veins of *Dioscorea* sp. **B.** Palmately lobed blade with 9 main, arcuate veins of *Dioscorea* sp. **C & D.** *Dioscorea* sp. with persistent indurate (spine-like) petiole, before and after shedding of blade. Photos by P. Acevedo.

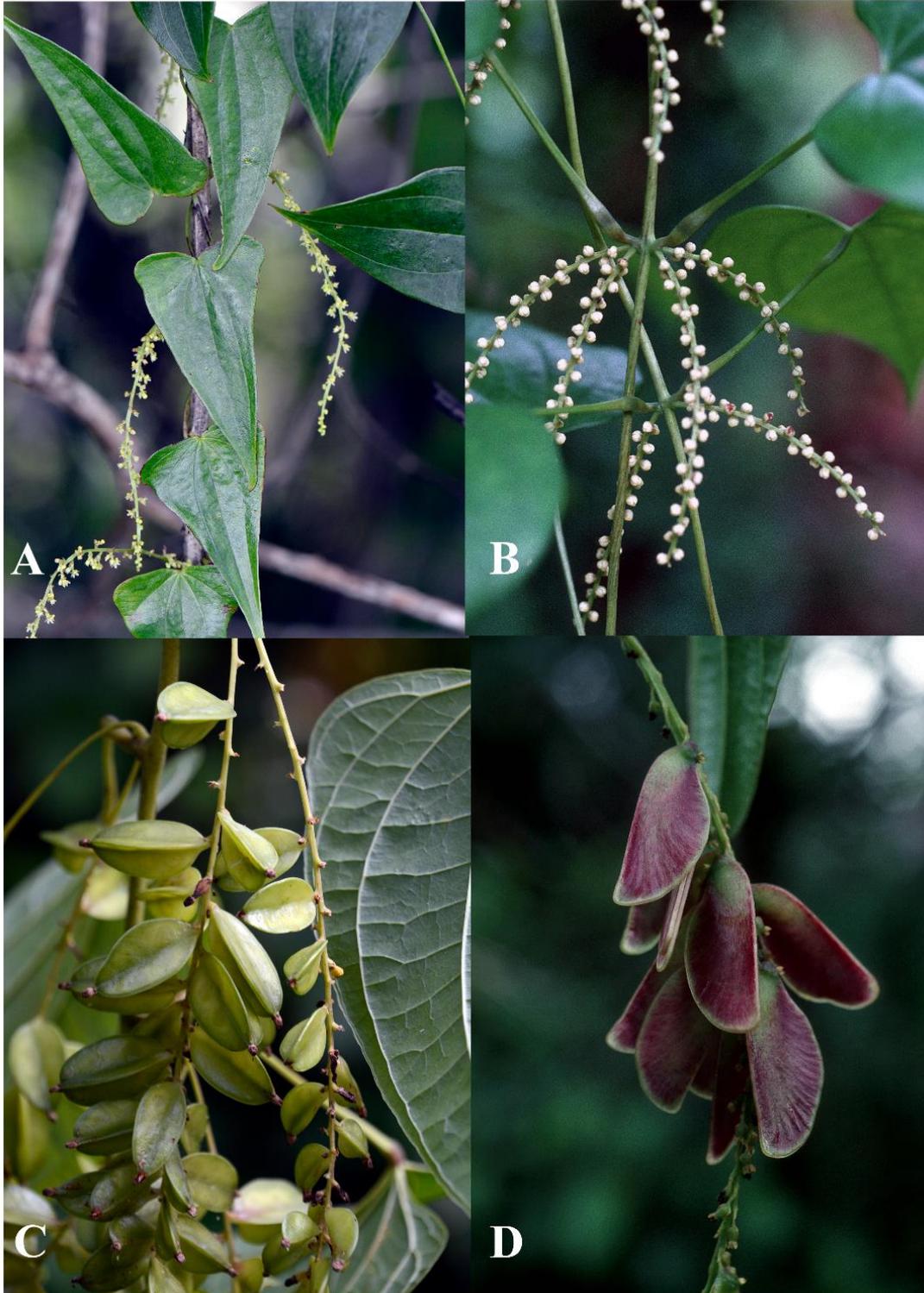


Figure 4. **A.** Pendent axillary, staminate thyrses of *Dioscorea cordata*. **B.** Spreading staminate spikes of *Dioscorea cayenensis*. **C.** Trilocular capsule of *Dioscorea* sp. **D.** Samara of *Dioscorea cordata*. Photos by P. Acevedo.

GENERIC DESCRIPTION

DIOSCOREA Linnaeus, Sp. Pl. 1032. 1753.

Rajania L.



Dioscorea sp., photo by P. Acevedo.

Dioecious, twining vines, herbaceous or slightly woody. Stems cylindrical, angular or winged, sometimes provided with thorns; cross sections in sub-woody species with visible wide vessel element lumens. Leaves alternate or opposite, simple or palmately lobed, with 3-7(-14) main arcuate, parallel veins, the margins entire; petioles usually long, pulvinate on both ends, sometimes geniculate; stipules often an auricular prolongation of the petiolar sheath or sometimes spiny; axillary bulbils often present, fleshy, of various shapes, size and textures. Inflorescences axillary, spikes, racemes, racemiform or paniculate thyrses, pendulous or ascendant produced in axillary spikes, racemes, or panicles. Flowers unisexual, actinomorphic, 6-merous; perianth minute; staminate flowers with 6 stamens

or sometimes with 3 stamens and 3 staminodia; pistillate flowers with 6 staminodia, the ovary inferior; styles 3, free or connate at base, with 3 to 6 stigma. Fruit a trilocular capsule, chartaceous, coriaceous or fleshy or a distally winged samara; seeds 6-12 per fruit, flattened and winged or only one in samaroid fruits.

Distinctive features: Herbaceous to sub-woody twiners with alternate or opposite cordiform, trilobed to palmately lobed leaves with 3-9(14) main, arcuate, parallel veins; stipules often auriculate; cross sections of stems with scattered conspicuous large vessels.

Distribution: A tropical and subtropical genus of about 800 species, 300 of which are found in the Neotropics, in moist, wet or seasonal forests.

USES

Several species of *Dioscorea* are commercially cultivated for their large edible tubers, a main source of carbohydrates in the tropics. The rhizomes of several species have medicinal value, some of which are the source of steroid compounds used in the manufacture of hormonal medicines such as birth-control pills and the treatments or various ailments. Most species, at one time or another produce aerial bulbils that are rich in starch (commonly known as air potatoes), some of which are consumed by humans or fed to livestock. Throughout the tropics, several species of *Dioscorea* are commonly used in the tropics as fish stupefactants (Acevedo, 1990).

RELEVANT LITERATURE

- Acevedo-Rodríguez, P. 1990. The occurrence of piscicides and stupefactants in the plant kingdom. *Advances in Economic Botany* 8: 1-23.
- Acevedo-Rodríguez, P. 2005. Vines and climbing plants of Puerto Rico and the Virgin Islands. *Contrib. United States National Herbarium* 51: 1-483.
- Ayensu, E. 1972. *Anatomy of the Monocotyledons. Dioscoreales VI*. Clarendon Press.
- Salmah, T., Nashriyah, M., Abdul Ghani Y. and Shamsul B.A.R. 2013. Anatomical Study of stem, petiole, leaf, tuber, root and flower of *Dioscorea hispida* Dennst. (Dioscoreaceae) by using optical microscope, SEM and TEM. *J. Agrobiotech.* 4: 33–42.

PICTURE VOUCHERS

Figure 1.

A-D. *Dioscorea* sp. (no vouchers).

Figure 2.

A. *Dioscorea sp.* (no voucher).

B. *Dioscorea alata* (no voucher).

Figure 3.

A-D. *Dioscorea sp.* (no voucher).

Figure 4.

A, D. *Dioscorea cordata* Rich. (no voucher).

B. *Dioscorea cayenensis* (Acevedo 1896).

C. *Dioscorea sp.* (no voucher).