

ZYGOPHYLLACEAE

by

A. L. STOFFERS

(Instituut voor Systematische Plantkunde, Utrecht)

Trees, shrubs or herbs. Leaves opposite or rarely alternate, petiolate; blade pinnately compound or sometimes simple. Flowers solitary or in cymose inflorescences, hermaphrodite, actinomorphic, 5—4-merous. Sepals free or sometimes united at the base, imbricate or rarely valvate. Petals free, imbricate or rarely valvate, sometimes wanting. Stamens twice or rarely thrice as many as the petals, obdiplostemonous, often appendaged at the base; anthers versatile, with longitudinal dehiscence. Intrastaminal disk mostly present. Ovary superior, sessile or shortly stipitate, 2—12- but mostly 4—5-locular. Ovules one to several per locule, pendulous, on an axile placenta; style one, terminal, furrowed or angular; stigma usually simple. Fruit various, often a loculicidal or septicidal capsule, rarely a drupe or berry. Endosperm present or wanting.

About 250 species in 26 genera in dry and warm regions.

Key to the genera:

1. Trees or shrubs 2
Herbs 3
2. Trees or shrubs with supra-axillary spines; leaves bi-foliolate; flowers yellowish-green *Balanites*
Small trees without spines; leaves 4- or more-foliolate; flowers blue or purplish *Guajacum*
3. Leaves 6—8-jugate; fruit spinose, separating into 5 bony carpels.. *Tribulus*
Leaves 2—3-jugate; fruit tuberculate, separating into 8—12 carpels
..... *Kallstroemia*

Guajacum Linnaeus, Spec. Plant. 381. 1753; Gen. Plant. ed. 5. 179. 1754

Small trees or shrubs with hard resinous wood; branchlets distinctly articulate. Leaves petiolate, opposite, 2—14-jugate; leaflets coriaceous, entire, glabrous, inequilateral. Stipules minute, more or less caducous. Flowers pedicellate, solitary and terminal or in false cymose umbels. Bracts minute, deciduous. Sepals 4 or 5, unequal, imbricate and somewhat united at the base. Petals 4 or 5, obovate, more or less unguiculate, imbricate, deciduous, blue or purple. Stamens 8—10, inserted on the inconspicuous disk; fila-

ments filiform, subulate or basally slightly winged, unappendaged; anthers versatile, sagittate or cordate. Ovary on a short gynophore, obovoid, 2—5-lobed, 2—5-locular; style slender, subulate, persisting and forming the beak of the fruit; stigma minute, entire or 2—5-lobed. Ovules 8—10 in each locule. Fruit a capsule, 2—5-lobed and -winged, obovoid, coriaceous, dehiscent septically. Seeds ovoid or ellipsoid, solitary in each locule. Embryo straight; cotyledons flat; endosperm present.

About 5 species from Florida Keys and Bahamas south through Central America to northern S. America; West Indies.

Key to the species:

1. Fruit broadly obovate or transversely elliptic, mostly 2-lobed; leaflets shiny, rounded at the apex..... *G. officinale*
Fruit obovoid, 5-angled; leaflets dull, usually mucronate..... *G. sanctum*

Guajacum officinale L.

LINNAEUS, Spec. Plant. 381. 1753; GRISEBACH, Fl. Br. W. Ind. Isl. 134. 1859 [‘1864’]; DUSS, Fl. phan. Ant. franç. 136. 1897; URBAN, Symb. Ant. 4: 314. 1905; BOLDINGH, Fl. D.W. Ind. Isl. 1: 99. 1909; JOHNSTON, Proc. Bost. Soc. Nat. Hist. 34(7): 224. 1909; BOLDINGH, Fl. Ned. W. Ind. Eil. 229. 1913; Fl. D.W. Ind. Isl. 2: 44. 1914; URBAN, Symb. Ant. 8: 317. 1920; BRITTON & MILLSPAUGH, Bahama Fl. 202. 1920; FAWCETT & RENDLE, Fl. Jamaica 4(2): 163, fig. 52. 1920; BRITTON & WILSON, Sci. Surv. Porto Rico & Virgin Isl. 5: 435. 1924; WILLIAMS, Flora Trinidad & Tobago 1: 118. 1929; QUESTEL, Fl. Isl. St. Bartholomew 126. 1941; LEON & ALAIN, Fl. Cuba 2: 375. 1951; ARNOLDO, Zakflora 27. 1954; Gekw. en nutt. pl. Ned. Ant. 70, fig. 101. 1954; Zakflora 212. 1964; GOODING *et al.*, Fl. Barbados 224, fig. 13. 1965; ARNOLDO, Gekw. en nutt. pl. Ned. Ant. 252, fig. 101. 1971; ADAMS, Flowering plants of Jamaica 381. 1972; FOURNET, Fl. Guadeloupe & Martinique 1457. 1978.

Small tree, usually not exceeding 8 m in height; bark smooth and grey, mottled; branches flexuous. Leaves 2—3-jugate, 3—9 cm long; leaflets inequilateral, sessile or subsessile, elliptic to obovate-elliptic, rounded at the apex, obtuse at the base, 1—5 × 1—3 cm, dark green or olive green on both sides; the veins prominent on both sides; petiole slightly winged, glabrous, up to c. 2.5 cm long. Stipules triangular, acute, pubescent, deciduous, about 1 mm long. Flowers in few- to many-flowered false umbels; pedicels slender, pubescent, 1—3 cm long. Sepals 5, ovate or suborbicular, rounded or obtuse at the apex, woolly, 4—6 mm long. Petals 5, obovate, rounded or obtuse at the apex and subtomentose, 12—14 mm long, blue. Stamens 10; filaments 7—10 mm long, bluish. Fruit yellowish, broadly obovate or transversely elliptic, 2-lobed or inequilateral when one part remains sterile, pointed with the base of the persistent style, 1.5—2 cm long and broad. Seeds ellipsoid, about 11 mm long and 7 mm wide, pale to dark brown; aril cream-coloured.

Florida, West Indies, and northern South America.

Common tree.

Vernacular names: wayacá, pokhout (Leeward Group)
lignum vitae (Windward Group).

ARUBA: Miralamar (Stoffers 2190, fr. Feb.); road near Ajó (Boldingh 6345, fl. Dec.); near Santa Cruz (Suringar s.n., fr. Feb. [L]); Kristal Berg (Suringar s.n., fr. Feb. [L]); without loc. (Koolwijk s.n., sub Suringar s.n., fr. [L]).

BONAIRE: Soebi Blancoe (Stoffers 618, fr. Nov.); Kralendijk (Arnoldo 988, fl. June); Joe-wa Hills (Boldingh 7216, fr. Feb.); Seroe Grandi near Fontein (Suringar s.n., st. Feb. [L]); Rincón (Suringar s.n., fr. [L]); Slagbaai Plantation (Suringar s.n., st. Feb. [L]); Klein Bonaire (Suringar s.n., st. Feb. [L]).

CURAÇAO: Brakkeput Mei Mei (Stoffers 194, fr. Oct.); near Savonet (Rutten-Pekelharing s.n., fl. June); Santa Cruz (Britton & Shafer 3023, fr. March); Santa Marta Baai (de Wilde 111A, fl. Ap.); hofje Weis Afo (Nagelkerken 151, st. March); Gasparito (Suringar s.n., fr. Feb. [L]); Fuik (Suringar s.n., st. Feb. [L]); Willemstad (Suringar s.n., fl. March [L]).

ST. MARTIN: Tintamarre (Boldingh 3370, st. Sept.; 3378, fl. Sept.).

Guajacum sanctum L.

LINNAEUS, Spec. Plant. 382. 1753; GRISEBACH, Fl. Br. W. Ind. Isl. 134. 1859 ['1864']; URBAN, Symb. Ant. 4: 315. 1905; BOLDINGH, Fl. Ned. W. Ind. Eil. 229. 1913; Fl. D.W. Ind. Isl. 2: 44. 1914; BRITTON & MILLSAUGH, Bahama Fl. 202. 1920; URBAN, Symb. Ant. 8: 318. 1920; BRITTON & WILSON, Sci. Surv. Porto Rico & Virgin Isl. 5: 435. 1924; LEON & ALAIN, Fl. Cuba 2: 375. 1951; ARNOLDO, Zakflora 27. 1954; Zakflora 212. 1964; Gekw. en nutt. pl. Ned. Ant. 252. 1971.

Small tree, usually 6—8 m tall; trunk short and stout, bark pale; branches pendulous, somewhat furrowed. Leaves 2—5-jugate, 4—10 cm long; leaflets inequilateral, subsesile, oblong to obovate or oblanceolate, usually apiculate or mucronate at the apex, 2—3.5 × 1.5—1.7 cm; petiole 8—14 mm long. Stipules acuminate, pubescent, about 3 mm long, caducous. Flowers solitary or in several-flowered false umbels in the axils of the upper leaves; pedicels slender, up to 2 cm long, pubescent. Sepals 5, obovate or oblong-obovate, pubescent and occasionally ciliate, 5—7 mm long. Petals blue or purple, broadly obovate, rounded at the apex, narrowed at the base, 7—11 × 5—7 mm, glabrous. Stamens 10; filaments 5—7 mm long. Ovary obovate, 5-angled. Fruit greenish-yellow to bright orange, broadly obovoid and ribbed, pointed by the base of the persistent style, 14—17 × 12—14 mm. Seeds elliptic, 10—11 × 3—4 mm, dark brown or black. Aril fleshy and scarlet.

Southern Florida, Bahamas, Greater Antilles, Aruba, Bonaire, Curaçao, and Yucatan.

Not common species, mostly in the limestone area.

Vernacular names: bera, bulabari, wayacá shimaron, wayacá machu (Leeward Group).

ARUBA: calcareous hills and plateau near Belashi (Boldingh 6431, fr. Jan.); calcareous hills near Savaneta (Boldingh 6547, fr. Jan.).

BONAIRE: Colombia Plantation (Stoffers 529, fr. Nov.); Montagne (Stoffers 876, fl. & fr. Dec.; 889, fr. Dec.); near Rincón? (Boldingh 7257, st. Feb.; Suringar s.n., st. Feb. [L]); Seroe Largoe (Arnoldo 516, fl. June; 359, fr. Jan.); near Pos San Dominico (Arnoldo 487a, fl. Ap.); Brandaris (Suringar s.n., st. Feb. [L]).

CURAÇAO: Noordkant (Curran & Haman 224, fl. March); hills near Klein Santa Marta (Boldingh 5623, st. Dec.); calcareous hills near Hato (Boldingh 5076, fr. Nov.; 5073, st. Nov.); without loc. (Curran & Haman 38, fl. Feb.).

Balanites Delile, Fl. d'Egypte 77. 1813 nom. cons. 3980

Trees or shrubs thorny by usually axillary spines. Leaves alternate, 1-jugate; leaflets entire, greyish-green, coriaceous. Inflorescence consisting of clusters or racemose cymes. Flowers yellowish-green. Bracts minute. Sepals 5, concave, deciduous, imbricate. Petals 5, oblong, more or less acute at the apex, glabrous or short-pubescent. Stamens 10, inserted at the base of the disk; filaments subulate; anthers versatile, opening by longitudinal, introrse slits. Disk high, the basal part 10-lobed. Ovary 5-locular, globose, partly surrounded by the disk, pilose; style as long as the ovary, cylindrical, terminal; stigma minute and inconspicuous. Ovules solitary in each locule, pendulous. Fruit a 1-seeded drupe. Seeds without endosperm. Embryo oblong. Cotyledons thick, plano-convex.

About 20 species from tropical Africa to India and Burma.

Balanites aegyptiaca (L.) Delile

DELILE, Fl. Aegypt. 221, t. 28. 1813; ARNOLDO, Zakflora 18, fig. 22. 1954; 211, fig. 22. 1964; Gekw. en nutt. pl. Ned. Ant. 25, fig. 15. 1954; 251, fig. 230. 1971; — *Ximenia aegyptiaca* LINNAEUS, Spec. Plant. 1194. 1753.

A high shrub or small tree, provided with supra-axillary spines; spines straight, ascending, up to 10 cm long; bark dark-grey to dark-brown with thick, ragged scales and long vertical fissures in which the yellow colour or the new bark can be seen; branchlets green, smooth, furrowed. Leaves petiolate; leaflets thick-coriaceous, elliptic to ovate, obtuse or somewhat emarginate at the apex, 1.5–3.5 × 1–3 cm; petioles 4–10 mm long. Flowers solitary or in supra-axillary clusters, rarely subracemose, yellowish-green, 10–12 mm in diam.; pedicels greyish pubescent. Sepals 5, ovate, tomentulose, about 4 mm long. Petals 5, about 6 mm long. Stamens 10; anthers sagittate. Disk about 1 mm high. Ovary about 1 mm long, soon lengthening after flowering, tapering into the style; style equaling the ovary in length. Fruit becoming yellow, broadly oblong-ellipsoid, 2.5 cm long, with a large stone surrounded by a yellow-brown edible flesh. Seeds affording an oil.

Drier parts of tropical Africa; introduced into Curaçao by Mr. C. Gorsira in 1885 and planted at Arrarat; nowadays widespread and naturalized in the eastern part of the island of Curaçao.

Vernacular names: lamunchi shimarón, corona di Hesús (Leeward Group).

CURAÇAO: Zuurzak (Arnoldo 1022, fl. Jan.); Klein St. Michiel (Stoffers 276, fl. Oct.).

Tribulus Linnaeus, Spec. Plant. 386. 1753

Annual or sometimes perennial herbs; stems herbaceous, diffusely branching, prostrate to decumbent or ascending, densely pubescent to glabrate, spreading radially from a central tap-root. Leaves opposite, even-pinnate, one of each pair alternately smaller or mostly near the top sometimes wanting; leaflets opposite, sessile or nearly so, the terminal pair pointed forward. Stipules lanceolate or subulate. Flowers solitary on pseudo-axillary pedicels, actinomorphic. Sepals 5, free, imbricate, caducous or persistent. Petals 5, free, imbricate, deciduous. Stamens 10, the outer whorl of 5 opposite the petals, somewhat longer and adnate basally to the petals, the inner 5 opposite the sepals and

subtended by nectariferous glands, the intrastaminal glands free or connate and then forming an urceolate ring surrounding the base of the ovary; filaments filiform or subulate, without appendages; anthers dorsifixed. Disk present, 10-lobed, thin. Ovary sessile, 5-locular and 5-lobed, each locule divided by transverse septa in 3—5 compartments, densely pubescent with long and rigid hairs; style 1, stout, cylindric, furrowed; stigmas 5, more or less connate, papillose. Ovules 3—5 per locule, superposed. Fruit pentagonal, separating into 5 mericarps without leaving a central axis; mericarps 3—5-seeded, tuberculate or spinose, internally divided by transverse septa in 3—5 one-seeded compartments. Seeds oblong-ovoid. Embryo straight; endosperm wanting.

An Old World genus of uncertain number of species, world wide distributed now but commonest in Africa and western Asia.

Tribulus cistoides L.

LINNAEUS, Spec. Plant. 387. 1753; GRISEBACH, Fl. Br. W. Ind. Isl. 134. 1859 [1864]; DUSS, Fl. phan. Ant. franç. 136. 1897; BOLDINGH, Fl. D.W. Ind. Isl. 1: 99. 1909; URBAN, Symb. Ant. 8: 318. 1920; BRITTON & MILLSPAUGH, Bahama Fl. 202. 1920; FAWCETT & RENDLE, Fl. Jamaica 4(2): 165, fig. 53. 1920; BRITTON & WILSON, Sci. Surv. Porto Rico & Virgin Isl. 5: 436. 1924; LEON & ALAIN, Fl. Cuba 2: 376. 1951; ARNOLDO, Zakflora 103, fig. 122. 1954; Zakflora 213, fig. 122. 1964; ADAMS, Flowering plants of Jamaica 381. 1972; FOURNET, Fl. Guadeloupe & Martinique 1458, fig. 691. 1978; — *Tribulus terrestris* LINNAEUS, Spec. Plant. 387. 1753; BOLDINGH, Fl. Ned. W. Ind. Eil. 229. 1913; — *Tribulus terrestris* L. var *cistoides* (L.) OLIVER, Fl. trop. Afr. 1: 284. 1868; URBAN, Symb. Ant. 4: 224. 1905; JOHNSTON, Proc. Bost. Soc. Nat. Hist. 34(7): 224. 1909; BOLDINGH, Fl. D.W. Ind. Isl. 2: 45. 1914.

Low spreading herb with jointed branches, ascending at the top, up to 1 m long, more or less pubescent with white hairs, glabrescent. Leaves petiolate; the larger ones up to 6 cm long, 6—9-jugate, the midrib ending in a mucro about 1 mm long; leaflets subsessile, oblong or elliptic, inequilateral, subacute and often mucronate at the apex, obliquely rounded-cordate at the base, up to 1.5 × 0.5 cm, silky pubescent beneath; alternate smaller leaves up to 2.5 cm long, 4—5-jugate with leaflets up to 10 × 3 mm, silky pubescent beneath; petioles 3—9(—12) mm long. Stipules lanceolate, 4—9 mm long. Flowers on long slender pedicels, inserted lateral of the axils of the alternate smaller leaves and exceeding them in length, 3—4 cm in diam.; pedicels slender, 2—4 cm long, pubescent. Sepals lanceolate, acute, appressed-hairy, up to 10 mm long, caducous. Petals obovate-cuneate, thinly membranaceous, broadly rounded-truncate at the apex, up to 2—2.5 × 1—2 cm, mostly bright yellow. Stamenal filaments subequal, 4—8 mm long; anthers about 1 mm long. Ovary hispid. Fruit up to 1 cm long; mericarps 4—5, with long white hairs, each provided at maturity with two horizontally spreading spines in the upper portion and two smaller ones in the basal portion.

Common weed.

Vernacular names: anglo (Leeward Group)
cockle corn (Windward Group).

ARUBA: near Noord (Stoffers 1548, fl. Jan.); vicinity of Oranjestad (Stoffers 2126, fl. & fr. Feb.; 2053, fl. & fr. Feb.); Savaneta (Stoffers 1766, fl. Jan.); between Noord and Westpunt (Stoffers 1777, fl. & fr. Jan.); Washington Plantation (Stoffers 1506, fl. & fr. Jan.); Mataguerai (Stoffers 1425, fl. & fr. Jan.); Sivi-Sivi (Boldingh 6320, fl.); Playa (Arnoldo

170, fl. & fr. Dec.); Oranjestad (Kruyt 4, fl. Dec.); without loc. (Koolwijk s.n., sub Suringar s.n., fl. [L]).

BONAIRE: along the seashore near Kralendijk (Stoffers 511, fl. & fr. Nov.; 945, fl. & fr. Dec.); Guatemala Plantation (Stoffers 801, fl. & fr. Nov.); Fontein (Stoffers 553, fl. & fr. Nov.); Rooi Pagaai (Stoffers 517, fl. Nov.); airfield (Stoffers 780, fl. & fr. Nov.).

CURAÇAO: Malpais (Stoffers 290, fl. Oct.); Cas Cora (Stoffers 249, fl. Oct.; Burgers 68, fl. & fr. Jan.); Klein Santa Marta (Stoffers 76, fl. & fr. Sept.); Mahoema (Boldingh 4816d, fl. & fr. Oct.); Willemstad (Went 1104, st. Nov.; Willemsse 32, fl. & fr. Aug.); Hofje Weis Afo (Nagelkerken 103, fl. Feb.); Beekenburg (Lens s.n. sub Went 807, fl. & fr. March); Patattentuin (Burgers 64, fl. Jan.); Patrick (Britton 3077, fl. & fr. March); Savonet (Suringar s.n., fl. & fr. Jan. [L]); Fort Nassau (Suringar s.n., fl. & fr. Jan. [L]); Hato (Suringar s.n., fl. & fr. Jan. [L]); near Piscadera Baai (de Wilde 136a, fl. & fr. March [L]); Brakkeput (Suringar s.n., fl. & fr. Jan. [L]); Fort Nassau (Suringar s.n., fl. & fr. Jan. [L]).

ST. MARTIN: near Philipsburg (Boldingh 2388, fl. & fr. Aug.); Fort William, 0—50 m (Boldingh 2548, fl. & fr. Aug.); Philipsburg (Stoffers 2324, fl. March); road west of Great Saltpond (Stoffers 2421, fl. & fr. March).

Kallstroemia Scopoli, Introd. 212. 1777

Annual or rarely perennial herbs, diffusely branching; stems up to 1 m long, herbaceous to suffrutescent, prostrate to decumbent or ascending, pubescent to glabrate, spreading radially from a taproot. Leaves opposite, even-pinnate, each pair alternately smaller or, mainly near the top wanting; rhachis terminating in a mucro; petioles usually shorter than the leaflets. Stipules persistent. Flowers solitary on pseudo-axillary peduncles, the latter swollen below the calyx, erect at anthesis, reflexed in bud and following anthesis. Sepals 5 or 6, lanceolate to broadly ovate, mostly persisting. Petals 4—6, free, elliptic to broadly obovate, spreading, deciduous. Disk fleshy, somewhat lobed. Stames 10—12, the outer ones epipetalous, somewhat longer and basally adnate to the petals, the alternate stamens usually shorter and at the base provided with a bilobed gland outside; filaments filiform, subulate or rarely winged at the base; anthers globose, ovoid or linear, versatile to sub-basifixed, with longitudinal dehiscence. Ovary sessile, 8—12-locular, without transverse septa; styles united, columnar or subulate from a conic base, persisting to form the beak on the fruit; stigma capitate. Ovules one per locule, pendulous, on an axile placenta. Fruit roughened or ovoid, tuberculate, separating at maturity into 3—12 mericarps, leaving a more or less persistent central axis; mericarps unilocular, without transverse septa, 1- or rarely 2-seeded, indehiscent, dorsally tuberculate. Seeds oblong-ovoid. Embryo straight. Endosperm wanting.

About 20 species, widely distributed in tropical regions.

Key to the species:

1. Ovary and body of the fruit glabrous or rarely strigose; style and beak glabrous; stigma capitate; sepals hirsute. *K. maxima*
Ovary and body of the fruit pubescent; style and beak glabrous to pubescent; stigma clavate, oblong or if capitate then style hirsute at the base or fruitbody appressed short-pilose; sepals hirsute and strigose or hispidulous. 2

2. Sepals hirsute and strigose; stigma clavate; fruit strigillose, beak 1.5—2 mm long and widely conical.....*K. curta*
 Sepals hispidulous with trichomes of two lengths; stigma capitate; fruit appressed short-pilose or strigose, beak narrowly conical or cylindrical above.....
*K. pubescens*

***Kallstroemia pubescens* (G. Don) Dandy**

DANDY in KEAY, Kew Bull. 10: 138. 1955; GOODING *et al.*, Fl. Barbados 225. 1965; ADAMS, Flowering plants of Jamaica 382. 1972; FOURNET, Fl. Guadeloupe & Martinique 1460. 1978; — *Tribulus pubescens* G. DON, Gen. Hist. 1: 769. 1831. — *Kallstroemia caribaea* RYDBERG in VAIL & RYDBERG, N. Amer. Fl. 25: 111. 1919; BOLDINGH, Fl. Ned. W. Ind. Eil. 230. 1913; Fl. D.W. Ind. Isl. 2: 45. 1914; URBAN, Symb. Ant. 8: 319. 1920; BRITTON & WILSON, Sci. Surv. Porto Rico & Virgin Isl. 5: 437. 1924; WILLIAMS, Fl. Trinidad & Tobago 1: 119. 1929; ARNOLDO, Zakflora 102, fig. 121. 1954; Zakflora 212, fig. 121. 1964; QUESTEL, Fl. Isl. St. Bartholomew 127. 1941; — *Kallstroemia maxima* auct. non WIGHT & ARN.; BOLDINGH, Fl. D.W. Ind. Isl. 1: 99. 1909.

Annual herb; stems diffuse, prostrate to decumbent and often ascending, up to 1 m or more long, striate, finely pubescent and sparingly hirsute and sericeous with apically directed, white trichomes. Leaves petiolate, 2—4 but usually 3-jugate, 2—6 cm long and up to 5 cm wide; leaflets oblique elliptic, oval or obovate, rounded and mucronate at the apex, more or less appressed-hirsute, 1—2 cm long; petioles about 1 cm long, shorter than the leaflets. Stipules lanceolate, 2—5 mm long and 1—2 mm wide. Flowers on slender pseudo-axillary peduncles. Sepals 5, narrowly linear-lanceolate, 4—7 × 2—3 mm, hispidulous with fine white trichomes of 2 lengths. Petals 5, obovate, truncate-ligulate or truncate-obovate, thinly membranaceous, 6—11 × 5—8 mm, white, yellow or pale orange. Stamens 10; filaments filiform, the inner row subtended by a small gland; anthers globose, small. Ovary pyramidal, densely appressed-short-pilose with fine white trichomes; style stout, columnar, conical; stigma capitate, slightly 10-lobed. Fruit ovoid, 5—6 mm in diam., densely appressed short-pilose; beak 5—8 mm long, conic at the base, equaling the body of the fruit in length; mericarps 3—4 mm high, cross-ridged and tuberculate to rugose.

From Mexico to Venezuela and northern Peru, Lesser Antilles, Puerto Rico and Jamaica; introduced into Florida, Ghana and Nigeria.

On open habitats, most common at lower elevations.

Vernacular name: anglo bobo (Leeward Group).

ARUBA: foot of Hooiberg (Arnoldo 129, fr. Dec.); Playa (Arnoldo 189, fl. & fr. Dec.); near Santa Cruz (Stoffers 1738, fl. & fr. Jan.); Sivi-sivi (Boldingh 6311, fr. Dec.).

BONAIRE: Rincón (Boldingh 7163, fr. Feb.); Sabana (Arnoldo 454, fl. & fr. Jan.); Labra (Stoffers 584, fl. & fr. Nov.); west of Jatoe Bacoe (Stoffers 646, fl. & fr. Nov.).

CURAÇAO: Groot St. Joris (Went 1341, fl. & fr. Dec.); Ronde Klip (Arnoldo 1804, fl. & fr. Dec.); Klein St. Michiel (Stoffers 5066, fr. Nov.); Malpais (Stoffers 291, fr. Oct.); Piscadera Baai (Burgers 45, fr. Dec.); Mahoema (Boldingh 4814, fr. & fr. Oct.); Klein Santa Marta (Stoffers 100, fr. Sept.).

SABA: road to Mary's Point (Arnoldo 844, fl. & fr. Aug.).

ST. EUSTATIUS: Bengalen (Boldingh 616, fl. & fr. June); without loc. (van Groll-Meyer 30, fr.).

ST. MARTIN: from Guana Bay to Philipsburg (Boldingh 2437, fr. Aug.).

Kallstroemia curta Rydb.

RYDBERG, in BOLDINGH, Fl. Ned. W. Ind. Eil. 230. 1913; Fl. D.W. Ind. Isl. 2: 45. 1914; ARNOLDO, Zakflora 103. 1954; Zakflora 213. 1964.

Diffusely branching annual; stems up to 1 m long, slender, prostrate, sparingly hirsute and sericeous with white apically-directed trichomes. Leaves petiolate, 2—3-jugate, terminal pair of leaflets largest, the leaves obovate in outline, 1—4 × 2—3 cm; leaflets obliquely ovate, 12—15 × 5—10 mm, mucronate, densely appressed-hirsute, veins and margin sericeous, glabrescent above, hirsute beneath, yellowish-green. Stipules subulate, 2—4 mm long, 1 mm wide, hirsute. Flowers in the axils of the smaller leaves, peduncles about 2—3 mm long, up to 1.5 cm in fruit. Sepals 5, subulate, 2.5—4 × 1—2 mm, hirsute and strigose. Petals 5, obovate or elliptic, glabrous, 3—4 × 2.5 mm, yellow or yellow-orange. Stamens 10; filaments filiform, as long as the style, those of the inner ones subtended by a small gland; anthers globose, small. Ovary ovoid, c. 1 mm in diam., pubescent; style as long as the ovary, conical, strigose; stigma clavate, 10-ridged. Fruit ovoid, 4—5 mm in diam, strigillose, 3 mm high, tubercled, the sides pitted and adaxial edge angled; beak truncate, conical, 1—2 mm long.

Curaçao, Aruba, Bonaire, Cuba, and Hispaniola.

In disturbed areas, mostly at lower altitudes.

Vernacular name: anglo bobo (Leeward Group).

ARUBA: Playa (Arnoldo 190, fl. & fr. Dec.).

BONAIRE: Sabana (Arnoldo 453, fl. & fr. Jan.).

CURAÇAO: rocky coastal hill near St. Joris Baai (Britton & Shafer 3096, fr. March. Isotype); Mahoema (Boldingh 4780, fl. Oct.); Julianadorp (Stoffers 325, fl. & fr. Oct.).

Kallstroemia maxima (L.) Hook. & Arn.

HOOKE & ARNOTT, Bot. Beechey 282. 1838; URBAN, Symb. Ant. 4: 315. 1905; JOHNSTON, Proc. Bost. Soc. Nat. Hist. 34(7): 224. 1909; BRITTON & MILLSPAUGH, Bahama Fl. 203. 1920; URBAN, Symb. Ant. 8: 318. 1920; FAWCETT & RENDLE, Fl. Jamaica 4(2): 166, fig. 54. 1920; BRITTON & WILSON, Sci. Surv. Porto Rico & Virgin Isl. 5: 436. 1924; QUESTEL, Fl. Isl. St. Bartholomew 126. 1941; LEON & ALAIN, Fl. Cuba 2: 376, fig. 153. 1951; ADAMS, Flowering plants of Jamaica 382. 1972; FOURNET, Fl. Guadeloupe & Martinique 1459, fig. 692. 1978; — *Tribulus maximus* LINNAEUS, Spec. Plant. 386. 1753; GRISEBACH, Fl. Br. W. Ind. Isl. 134. 1859 ['1864']).

Annual herb; stems prostrate to decumbent, up to 1 m or more long, sparingly hirsute with apically-directed, white or yellow trichomes, becoming glabrate. Leaves petiolate, obovate in outline, 3—4 (—6)-jugate, 1—6 cm long and up to 5 cm wide; leaflets broadly oblong to elliptic, inequilateral, rounded to acute and mucronate at the apex and strongly inequilateral at the base, 0.5—3 cm long and 0.3—1.5 cm wide, the terminal

pairs usually largest, appressed-hirsute to glabrate, at least the margins ciliate by stiff hairs; petioles 3—8 mm long, appressed hirsute. Stipules subulate, 3—5 mm long and 1 mm wide, appressed pubescent and ciliate. Flowers 7—25 mm in diam., on peduncles which are at first shorter than the subtending leaves but equaling them or longer in fruit and then straight or curved, 1—5 cm long. Sepals 5, ovate, 3—8 × 2—3 mm, as long as or little shorter than the petals, hirsute, trichomes appressed to spreading. Petals 5, obovate, marcescent, 5—12 × 10 mm, white through yellow to pale orange, base white to yellowish-green or green. Stamens 10; filaments as long as the style; anthers ovoid or rarely linear, small, yellow to red-orange. Ovary ovoid, glabrous or occasionally strigose at the base; style 2—3 mm long, cylindric and slightly conical at the base; stigma capitate, c. 1 mm long, obscurely 10-lobed. Fruit ovoid, 5—6 mm in diam., glabrous but occasionally strigose at the base (or occasionally to the base of the beak); beak 3—7 mm long, usually as long as the body of the fruit, glabrous, cylindrical and the base widely conical. Mericarps 3—4 mm high, abaxially tubercled cross-ridged and slightly keeled.

From South Carolina through Mexico, Central America and West Indies to northern South America.

On open habitats.

SABA: Booby Hill, 475 m (Stoffers 3165, fr. Jan.).

ST. EUSTATIUS: along roads in Oranjestad (Stoffers 3905, fr. July).