

CULTIVATED GENERA

Amaryllis belladonna L., from South Africa, was cited by Britton & P. Wilson (1924) as planted for ornament in Virgin Islands gardens.

Cyrtanthus uniflorus Ker Gawl., from South Africa, was recorded by Krebs as formerly grown in St. Thomas (Britton & P. Wilson, 1924).

Molineria hortensis Britton, collected and described by Britton (1924) from a plant cultivated in a garden near La Muda, Caguas, Puerto Rico, origin unknown. The type is: *Britton 7892* (holotype: NY).

Narcissus tazetta L., native to Europe, was cited by Martorell et al. (1981) as cultivated in Puerto Rico.

Sprekelia formosissima (L.) Herb., of Mexican origin, was cited by Britton & P. Wilson (1924) as occasionally grown for ornament in Virgin Islands gardens.

Family 15. **AGAVACEAE** *Century Plant Family*

Agavaceae Dumort., Anal. Fam. Pl. 57. 1829, *nom. conserv.*

by G. R. Proctor & P. Acevedo-Rodríguez

Chiefly large, more or less succulent, leathery or fibrous rosette herbs to very large rosette shrubs or trees with stout woody trunks often with secondary tissue growth. Roots fibrous and sometimes rhizomatous; plants sometimes proliferating by means of stolons. Leaves spirally arranged and with margins entire, spiny, or toothed, usually broadest near the base and gradually tapered to a sharp apex, the vascular bundles in the leaves are accompanied by thick, strong fibers, thus making possible the use of various species as textile plants. Inflorescence stalks (scapes) stout, terminal, clothed with few or many more or less appressed bracts; inflorescence large, paniculate with more or less cymose branches; in many species the plant is monocarpic, producing a giant inflorescence and then dying. Flowers usually bisexual, trimerous, hypogynous or epigenous, actinomorphic or slightly zygomorphic, and usually rising from the axils of well-developed bracts; tepals (segments) most often white or yellow, and are free or more or less fused into a tubular or campanulate perianth, sometimes abruptly widened and urceolate in the outer part. Stamens 6, inserted at or near the base of the perianth, the filaments sometimes short and relatively stout (*Yucca*) or else filiform and long-exserted (*Agave*); anthers introrse, often peltate, opening longitudinally; pollen with reticulate exine, the grains dispersed singly or in tetrads. Ovary 3-locular, each cavity with several to many ovules; style short to rather long, with punctiform to trilobate stigma. Fruit a dry or berry-like capsule containing several to many seeds; seeds often flattened or compressed. An entirely New World family of about 8 genera and more than 300 species. Many species have been introduced into all the warmer parts of the world, either for ornament or for commercial production of textiles, and some of these have become naturalized in various countries.

The circumscription used for this family follows that of Dahlgren et al. (1985), as substantiated by Bogler & Simpson (1996). The broader concepts of R.A. Howard (1979, *Flora of the Lesser Antilles*) and Lott & García-Mendoza (1996, *Flora Mesoamericana*) are not supported by the recent DNA sequence studies of Bogler & Simpson (1996).

TYPE: *Agave* L.

References: Bogler, D. J. & Simpson, B. B. 1996. Phylogeny of Agavaceae based on its rDNA sequence variation. *Amer. J. Bot.* 83: 1225-1235. Dahlgren, R. M. T., H. T. Clifford & P. F. Yeo. 1985. *The Families of the Monocotyledons*, pp. 157-161, Springer-Verlag, Berlin, Heidelberg, New York, Tokyo.

Key to the genera

1. Flowers erect on cymose or umbellate inflorescence branches; perianth yellow or greenish yellow; stamens exerted 1. *Agave*
1. Flowers more or less pendulous, on racemose inflorescence branches or in panicles; perianth white or greenish white; stamens included. 2
 2. Plants acaulescent with a large rosette of elongate leaves with toothed or spiny margins 2. *Furcraea*
 2. Plants shrubby with branched woody stems each ending in a tight spiral rosette of entire dark green spine-tipped leaves 3. *Yucca*

1. AGAVE

Agave L., Sp. Pl. 323. 1753.

Robust perennial (usually monocarpic) rosette plants, usually acaulescent but sometimes producing a short sub-woody trunk; roots hard, fibrous. Leaves large, succulent, fibrous, spine-tipped, the margins sparsely to densely armed with hard, sharp prickles (rarely smooth and entire). Inflorescence paniculate (rarely racemose or spike-like, these not Antillean), often up to 6 m tall or more, with a stout main stalk (scape) clothed with more or less appressed spine-tipped bracts; branches usually many, horizontal or ascending. Flowers in cymose or umbellate clusters, these often dense; perianth tubules toward the base, the segments imbricate in bud. Stamens 6, the filaments long-exserted, the anthers attached at the middle. Ovary inferior, 3-locular, the many ovules in 2 rows in each locule; style elongate with 3-lobed stigma. Fruit a dry, many-seeded, loculicidally dehiscent capsule; seeds flattened, black (or white if abortive). A widely distributed genus of more than 200 species (300 according to some authors), found from southern United States, Mexico and Central America, the West Indies (including the Bahamas, Greater Antilles, Cayman Islands, and Lesser Antilles), and South America to Peru and Argentina.

LECTOTYPE: *Agave americana* L., designated by Britton & P. Wilson, Bot. Porto Rico 5: 156. 1923.

References: García-Mendoza, A. & F. Chiang. 2003. The confusion of *Agave vivipara* L. and *A. angustifolia* Haw., two distinct taxa. *Brittonia* 55: 82-87. Gentry, H. C. 1982. *Agave* of Continental North America. 670 pp. Univ. of Arizona Press. Trelease, W. 1913. *Agave* in the West Indies. *Mem. Natl. Acad. Sci.* 11: 1-55, t. 1-116. 1913.

Key to the species of *Agave*

1. Leaf-margins straight, the marginal prickles usually not over 5 mm long, with lenticular bases. 2
 2. Flowers bright yellow (native species). 3
 3. Inflorescences ca. 1.2 m tall; leaves less than 1 m long. 2. *A. minor*
 3. Inflorescences 3-7 m tall; leaves to 2.75 m long. 4
 4. Leaves less than 15 cm wide; marginal prickles 1-1.5 mm long (St. Croix) 1. *A. eggersiana*
 4. Leaves up to 25 cm wide; marginal prickles mostly 2-5 mm long (rarely more) (Puerto Rico & Virgin Islands, except St. Croix) 3. *A. missionum*
 2. Flowers pale greenish or yellowish green (introduced species, often cultivated, sometimes naturalized). 5
 5. Leaves dark green, less than 8 cm wide, with many marginal prickles; perianth 2-3 cm long 5. *A. vivipara*
 5. Leaves gray-green, glaucous (at least at first), 10-12 cm wide, with smooth margins or with few marginal prickles; perianth 4-6 cm long 4. *A. sisalana*
1. Leaf-margins undulate, the marginal prickles up to 10 mm long, borne on dilated bases of leaf-tissue 6

6. Leaves whitish gray-green, strongly arching and often recurved; often cultivated but so far naturalized or seen flowering in the West Indies [*A. beauleriana*]
 6. Leaves gray-green, straight, mostly erect; capsules black, up to 6 cm long [*A. americana*]

1. *Agave eggersiana* Trel., Mem. Natl. Acad. Sci. 11: 28, t. 31-33. 1913. Type: St. Croix, U.S. Virgin Islands. *Ricksecker* 282 (US!).

Acaulescent plant. Leaves numerous, forming a rosette, narrowly lanceolate, mostly 1.2-2 m long, nearly straight and erect, apex with a brown, terminal, awl-shaped, spine, 1.5-2 cm long, margins with straight or up-curved prickles 1-1.5 mm long, with broadly lenticular blackish brown base. Inflorescence to 5 m tall or more, the scape bearing distant deltate bracts, the slightly ascending branches densely-flowered. Flowers deep yellow, on pedicels 2-2.5 cm long; ovary 2-3 cm long, nearly equaling the length of the perianth, the whole flower (excluding the stamens) thus 5-6 cm long; filaments 4.5-5 cm long, nearly twice as long as the tepals. Fruits unknown; after flowering, the panicles produce numerous vegetative bulbils by which the species can be propagated.

General distribution: Endemic to St. Croix, where it now appears to be extinct in the wild. Now cultivated in St. Croix and St. Thomas, but relatively few plants exist.

Selected specimens examined: ST. CROIX: Christiansted: *Rose et al.* 3535 (US); District of Prince: S side of Alexander Hamilton Airport, *Proctor et al.* 45490 (US-2).

2. *Agave minor* Proctor, sp. nov. Type: Puerto Rico. Cabo Rojo; Bo. Llanos Costa: Outlying s ridge of Sierra Bermeja, between Rancho Cassaba and Arroyo Cajul, elev. 100-200 m, 15 Jun 1991 (fr), *Proctor, Judd, and Rivera* 46978 (holotype: SJ, pictures at NY UPRRP, US!).

A Agave missionum Trelease inflorescentia, foliis et fructibus minoribus differt.

Acaulescent, the plants clustered by means of short stolons. Leaves ascending to erect in a tight rosette, lanceolate or narrowly elliptic, 40-60 × 4.5-6 cm, the apical spine needle-like, up to 3 cm long, the marginal prickles ca. 1 mm long, mostly spaced 6-10 mm apart. Inflorescence (1 seen) 1.2 m tall, the axis ca. 90 cm long, ca. 1.5 cm in diam.

near the base, tapering to ca. 0.7 cm at base of panicle; scape-bracts widely separated, deltate-acuminate with spinose apex, 3-4.5 cm long. Inflorescence branches few, short, ascending, with peduncles 1.5-4 cm long, the flowers densely clustered on very short branches from the apex. Perianth (only dried withered ones seen), yellow, ca. 1.5 cm long. Capsules rounded-oblong, ca. 2 cm long, 1.4-1.6 cm in diam., deeply grooved between locules; seeds angular, rugose, ca. 5 mm wide.

Agave minor differs from any other native *Agave* species by its shorter leaves and inflorescences.

General distribution: Known only from a population of several individuals, in dry scrubland.

3. *Agave missionum* Trel., Mem. Natl. Acad. Sci. 11: 37. 1913. Type: St. Thomas, U. S. Virgin Islands. *Trelease* 15 (holotype: MO).

Agave portoricensis Trel., Mem. Natl. Acad. Sci. 11: 38. 1913. Type: Puerto Rico; between Coamo & Aibonito. *Trelease* 7 (holotype: MO?).

Figs. 27. A-E; 61. E

Acaulescent, not proliferating by stolons or offsets; leaves fleshy, forming a large rosette, lanceolate to broadly lanceolate, mostly 0.9-2.75 m × 13-23 cm, dark glossy green, acuminate to a spinose apex, the apical spine awl-shaped, 1.5-2.5 cm long, brown, smooth, decurrent at base and dorsally produced into the green leaf-tissue; marginal prickles brown or blackish, 3-5 (-6) mm long, straight or variously recurved, mostly spaced 7-15 mm apart. Inflorescence an elongate stalked panicle up to 7 m tall, the scape about equaling the flowering part; main-panicle-branches horizontal or sometimes slightly ascending, bearing dense cymose clusters of erect yellow flowers; pedicels 1.5-2 cm long. Flowers 4.5-5.5 cm long including ovaries ca. 2 cm long. Stamens long-exserted, with falcate anthers 1.4-1.7 cm long. Style 4-5 cm long, with a 3-lobed stigma. Capsules broadly oblong-ellipsoid or somewhat turbinate, 2.5-3.5 cm long, 1.8-2.5 cm in diam. Seeds flat, irregularly and obtusely triangular, 5-9 mm wide. Many plants

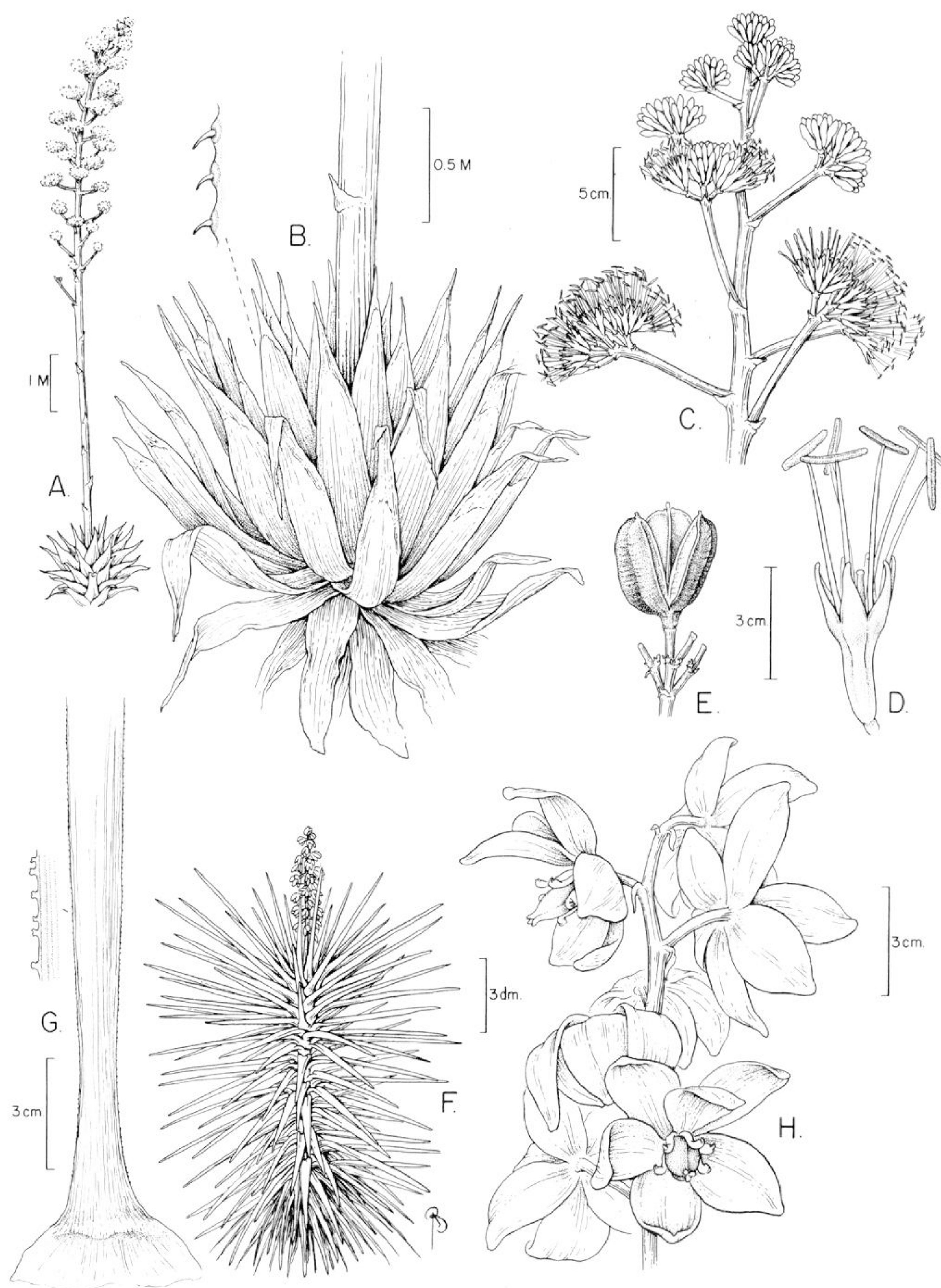


Fig. 27. A-E. *Agave missionum*. **A.** Habit. **B.** Basal rosette of leaves and detail of leaf margin. **C.** Upper portion of inflorescence. **D.** Flower. **E.** Dehiscent capsule. **F-H.** *Yucca aloifolia*. **F.** Habit. **G.** Basal portion of leaf, and detail of margin. **H.** Upper portion of inflorescence with open flowers. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

produce vegetative bulbils on the inflorescence, sometimes mixed with capsules, or sometimes in the absence of capsules.

General distribution: Endemic to Puerto Rico and the Virgin Islands, but absent from St. Croix.

Distribution in Puerto Rico and the Virgin Islands: In dry, rocky, mostly non-calcareous habitats from near sea level to ca. 800 m elevation. Recorded from Aibonito, Coamo, Culebra, Guánica, Sabana Grande, Salinas, and Vieques; Anegada, Guana Island, St. John, St. Thomas, Tortola, and Virgin Gorda; also present on many of the smaller islets.

Common names: Puerto Rico: *Cocuiza*, *Maguey*; Virgin Islands: *Karata*.

Note: This species is somewhat variable in several characters, including size of marginal leaf-prickles, shape of panicle, texture of capsules, and presence or absence of bulbils.

Selected specimens examined: PUERTO RICO: Coamo: vicinity of Coamo Springs, *N.L. Britton & Brown 5702* (US). Coamo-Aibonito, *Stevenson 6934* (US). Culebra: *N.L. Britton & Wheeler 236* (US). Guánica: Ensenada, *Britton et al. 8322* (US); Montalva, *N.L. Britton et al. 4878* (US). Sabana Grande, *Sargent 755* (US). Salinas: Bo. Río Jueyes, *Proctor & Díaz 44753* (US-2); Bo. Lapa, *Proctor et al. 43725* (US-2). Vieques: Ensenada Honda to Puerto Medio, *Shafer 3018* (US). ST. JOHN: Lameshur: *N.L. Britton & Shafer 497* (US). TORTOLA: Guana Island, *Proctor 43413, 43699* (US).

4. *Agave sisalana* Perrine, House Rep. Document 564: 87. 1838. Neotype: Mexico; Chiapas. Ocosocoautla, *Gentry 16434* (US), designated by H.S. Gentry, *Agaves* Cont. N. Amer. 628. 1982.

Fig. 61. G

Acaulescent or sometimes with a short caudex up to 1 m tall; plants spreading by numerous stolons. Leaves linear-lanceolate, to 1.5 m long, 10-12 cm wide, the central ones rigidly erect, but many of the outer ones more or less reflexed, glaucous gray-green at first, becoming green; apical spine conic-subulate, 2-2.5 cm long, shallowly round-grooved at base; margins usually smooth but sometimes with small scattered prickles. Flowers in clusters of 2 or 3 on the many panicle-branches; perianth 4-6 cm long, yellowish

green; stamens inserted at the level of perianth-fusion, the filaments linear, red-spotted, 7.5-8 cm long; anthers 2.5-2.7 cm long, brown-spotted. Ovary 2-2.5 cm long with style becoming 7-8 cm long. Capsules rarely formed, oblong, up to 6 cm long, 2-2.5 cm in diam., stipitate and beaked; seeds (if any) probably not viable. Vegetative bulbils commonly produced below the flowers in the axils of bracts. Cytologically this species is a sterile pentaploid evidently of hybrid origin.

General distribution: Probably native in the region of Chiapas, Mexico (Gentry, 1982), but now grown all over the world in hot dry regions as a source of useful textile fibers. It often persists indefinitely in abandoned plantations, and easily becomes naturalized.

Distribution in Puerto Rico and the Virgin Islands: No voucher specimens from Puerto have been seen except from Mona Island, but this species is definitely naturalized in parts of the Guánica State Forest, and can be expected to occur elsewhere. In the Virgin Islands it was long ago recorded from St. Croix as "established" by Trelease (1913).

Common name: Puerto Rico: *Sisal*.

Note: In 1982, Gentry (p. 628) neotypified the name of this species with one of his own specimens from Chiapas, Mexico, without mentioning the original material collected by Perrine.

Selected specimens examined: PUERTO RICO: Mona Island, *Acevedo-Rdgz. & Siaca 4373* (FTG, NY, SJ, US).

5. *Agave vivipara* L., Sp. Pl. 323. 1753. Lectotype: C. Commelijn, *Praeludia Bot. t. 15*. 1703, designated by Wijnands, Bot. Commelins. 35. 1983.

Acaulescent rosette plants sometimes developing a short trunk; freely surculose. Leaves narrowly linear to lanceolate, 40-75 cm × 3.5-8 cm, the apical spine 2.4-4 cm long, the upper surface flat, the marginal prickles black, 2-5 cm long, up-curved, sinuous or recurved from a black deltoid base. Inflorescence up to 3 m tall or more, the scape-bracts spreading; flowers pale green, the tepals shading to light yellow toward the tips, the perianth ca. 2 cm long. Capsules subglobose to broadly ovoid, 3-5 cm long. Proliferous bulbils often produced on the inflorescence-branches after flowering.

General distribution: Occurs widely, both naturally and under cultivation, from northwestern most Mexico to Nicaragua; commonly cultivated in the West Indies and probably in most warm countries, sometimes escaping and becoming naturalized.

Distribution in Puerto Rico and the Virgin Islands: Frequently cultivated in Puerto Rico, especially a yellow-margined variant (*A. vivipara* 'marginata' (Gentry) P. Forst., Brittonia 44: 74. 1992). The non-marginate form is recorded from "Tortuguero area"; escaped on Guana Island

Selected specimens examined: PUERTO RICO: Manatí (?): Tortuguero, Liogier et al: 33548, 28

Oct. 1982 (UPR).

Cultivated Species

Agave americana L., a Mexican species sometimes cultivated in Puerto Rico and the Virgin Islands, apparently is not naturalized. *Agave beauleriana* Jacobi is sometimes cultivated in Puerto Rico. In addition to these, Britton and P. Wilson (1923) listed the following as cultivated: *A. fourcroydes* Lem., of Yucatan, planted for fiber in Puerto Rico and the Virgin Islands; and *A. evadens* Trel., native of Trinidad, *A. jacquiniana* Schult., and *A. neglecta* Small, endemic to Florida, U.S.A., as all cultivated in St. Thomas at Louisenhoj.