

FSA contributions 4: Agavaceae

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Family **Agavaceae** Endl. Enchiridion botanicum: 105 (1841) nom. cons. Cronquist: 1217 (1981).

Robust, monocarpic, usually rosulate perennials arising from short rhizome or short erect caudex. *Stem* commonly with monocotyledonous type secondary growth. *Leaves* usually crowded in basal rosette, leathery to succulent, amplexicaul, persisting for many years; each vascular bundle with well-developed fibrous cap at phloem pole. *In-florescence* apical, tall, fast-growing, terminating in a panicle, often massive. *Flowers* bisexual, actinomorphic or somewhat zygomorphic, tubular, pedicellate, trimerous throughout. *Perianth* petaloid, 3 + 3, often fleshy, united below to form a tube. *Stamens* 3 + 3; anthers mostly dorsifixed, introrse, versatile, opening by longitudinal slits, linear to oblong. *Ovary* trilobular, inferior, with septal nectaries, placentation axile, ovules in 2 vertical rows in each locule; style terminal, stigma 3-lobed. *Fruit* a loculicidal capsule. *Seeds* numerous, flattened, centrally embedded in copious, very hard endosperm. *Chromosome numbers*: $2n = 60, 120, 149, 150, 180$ (Bolkhovskikh *et al.* 1969).

When the plan for the *Flora of southern Africa* was first published in 1963, it did not include the Agavaceae as currently circumscribed. Two representatives of the genus *Agave* L., *A. americana* L. and *A. sisalana* Perrine, are naturalized in South Africa, and the family as defined here warrants inclusion in the *FSA* series.

The Agavaceae is a family of about 12 genera and 400 species, occurring mostly in the New World tropics and subtropics, and India to Australia (*Cordylina* Comm. ex R.Br.). Numerous genera are cultivated in southern Africa by collectors and in amenity horticulture, but only two species of *Agave* are naturalized. The boundaries and content of this heterogeneous family is still debated; the circumscription upheld here follows Brummitt (1992), which approximates the interpretation of Cronquist (1981).

1219000 AGAVE

Agave L., Species plantarum 1: 323 (1753); Trelease: 231 (1914); Berger: 21 (1915); Gentry: 41 (1972); Gentry: 10 (1978); Gentry: 61 (1982); Pedley & Forster: 72, 74 (1986); Couper & Cullen: 278 (1988). Type: *A. americana* L.

Description as for family.

Agave is a New World genus of ± 275 species. One introduced species, *A. americana* L., is naturalised around sites of habitation, mainly in the more arid, karroid regions

of southern Africa. A second species, *A. sisalana*, has been used as a barrier plant during South Africa's border war and for fibre production in plantations in various—mainly summer rainfall—savanna regions of the subcontinent. This species has also subsequently become naturalized in South Africa. Both species are included in catalogues of problem plants in southern Africa (Wells *et al.* 1986; Henderson 1995). Distribution maps for the species (Figures 1 & 2) are based on those included in Henderson (1995). Additional attempts to obtain a clearer picture of naturalized distribution, uses and history of *Agave* in southern Africa are being made (Smith 1995a, b; Smith & Crouch 1996).

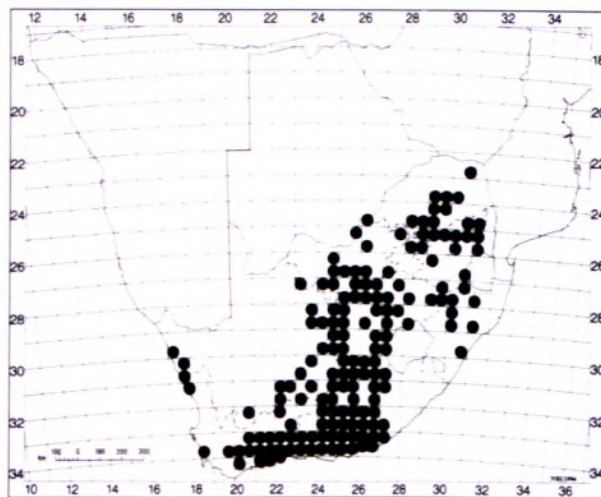


FIGURE 1.—Distribution map of *Agave americana* in southern Africa.

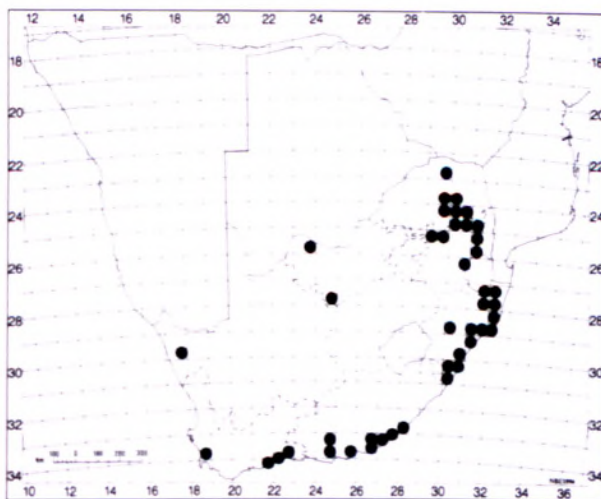


FIGURE 2.—Distribution map of *Agave sisalana* in southern Africa.

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The name *Agave* was taken from the Greek, *aganos*, which means noble or admirable.

Key to species in southern Africa

- Leaves lanceolate, reflexed, usually glaucous green, up to 2 m long; marginal teeth present on mature leaves, straight or recurved; panicle not bulbiferous; flowers 70–100 mm long *A. americana*
- Leaves ensiform, rigid, usually light to dark green, up to 1.3 m long; marginal teeth absent from mature leaves; panicle bulbiferous after flowering; flowers 55–65 mm long *A. sisalana*

1219000-00100 *Agave americana* L., Species plantarum 1: 323 (1753); Berger: 151 (1915); Gentry: 278 (1982); Pedley & Forster: 74 (1986); Couper & Cullen: 280, 281 (1988). Type: 'America calidiore' specimen 443.1 Herb. Linnaeus [LINN, holo. non vidi; fide Gentry: 278 (1982)].

Agave complicata Trel. ex Ochot.: 100 (1913).

A. gracilispina Engelm. ex Trel.: 234 (1914).

A. melliflua Trel.: 234 (1914).

A. zonata Trel.: 234 (1914).

A. felina Trel.: 128 (1920). Type: Durango, *Trelease s.n.* (MO, holo.) non vidi.

A. rasconensis Trel.: 122 (1920). Type: San Luis Potosi, Rascón, *Trelease 75* (MO, holo.) non vidi.

A. subzonata Trel.: 129 (1920). Type: Nuevo Leon, Monterrey, *Trelease s.n.* (MO, holo.) non vidi.

Herbaceous, succulent multi-annual, freely suckering; rosettes trunkless, 2–4 m in diameter, 1–2 m tall. *Leaves* lanceolate to oblanceolate-spathulate, rigidly spreading to reflexed, 1–2 × 0.3 m, light green to (more commonly) glaucous grey-green; surfaces smooth; margins sinuous-toothed, teeth straight or sometimes slightly recurved, shiny blackish brown to grey, 5–10 mm long, 20–60 mm apart; apical spine conical to subulate, 30–50 mm long, shallowly grooved above for ± half its length, brown to grey. *Inflorescence* paniculate, 4–9 m tall, with up to 35 umbellate side branches in upper half of peduncle. *Flowers* light greenish yellow, 70–100 mm long. *Perianth* with tepals subequal in length but of more or less similar shape, spatulate, slender, outer segments cucullate at tip, 25–35 mm long. *Stamens* epipetalous; filaments subulate, 60–90 mm long; anthers yellow, 30–40 mm long. *Ovary* oblong-ovoid, broadly trigonal, indistinctly 6-grooved, sessile, 30–45 mm long; style filiform, at length longer than filaments; stigma capitate, apical, becoming well exerted, usually considerably exceeding anthers after anthesis. *Capsule* oblong, short-beaked, 40–60 × 20–30 mm. *Seeds* 6–9 × 5–7 mm. *Chromosome numbers*: 2n = 60, 120, 180 (x = 30) (Granick 1944). Figure 3.

The species comprises one subspecies and seven varieties (excluding the typical subspecies and variety). One of these, *Agave americana* (subsp. *americana*) var. *americana*, has become naturalised in southern Africa. The widely cultivated *A. americana* var. *picta* which has variable yellow or whitish leaf striations has not been as successful in colonizing suitable habitats in southern Africa, and only the typical variety is regarded as naturalized.

The form of *A. americana* which is naturalized in southern Africa is morphologically and chorologically remarkably uniform, as though from a single clone. The little variation encountered during field observations occurs primarily in the size of plants, depending on age, crowding, or on individual sites. A form with light glaucous green, stiff leaves is sometimes encountered, particularly between Montagu and Ouberg Pass in the southwestern Cape. *A. americana* flowers in midsummer (late December, January and early February) in southern Africa.

In times of drought in some areas of the Great Karoo the leaves of cultivated plants are cut and used as forage for sheep. Honey produced from the nectar of *A. americana* has an unpleasant taste.

A. americana occurs in Arizona and Texas in the southern United States of America and in Baja California Sur, Chihuahua, Coahuila, Durango, Hidalgo, Jalisco, Nuevo Leon, Oaxaca, Queretaro, San Luis Potosi, Tamaulipas, Vera Cruz and Zacatecas in Mexico (see Gentry 1982: 305, 306 for a more complete list of exsiccatae of *A. americana*, including its varieties). *A. americana* is a complex species that has been misunderstood by some authors (Drummond 1910; Gentry 1982). The polymorphic nature of *A. americana* is evidenced by the numerous infraspecific segregates that have been described. It is generally interpreted as a phylogenetically advanced species in the section *Americanae* of the genus (Gentry 1982: 270).

Voucher: *G. F. Smith 241* (PRE).

Icones: Gentry: figs 2.8B, 12.6 & 12.7 (1982); Ullrich: figs 1–62 (1993).

Common names: English: agave, American agave, American aloe, century plant. Afrikaans: Amerikaanse aalwee, Amerikaanse aalwyn, blou-aalwee, gareboom, garingboom, kaalgaarboom, makaalwyn. Sotho: lekhala.

1219000-01300 *Agave sisalana* Perrine in United States of America 25th Congress, 2nd session, House of Representatives Report No. 564 (Tropical Plants): 8, 9, 16, 47, 60, 86 (1838a); Perrine: 36, 105, 140 (1838b); *Trelease*: 49 (1913); Berger: 230 (1915); Gentry: 628 (1982); Pedley & Forster: 75 (1986); Couper & Cullen: 282 (1988). Type: Ososocoautla, Chiapas, Mexico, 22 March 1957, *H. S. Gentry 16434* [US, DES, neo. non vidi; fide Gentry: 628 (1982)].

Herbaceous, succulent multi-annual, freely suckering; rosettes with a trunk of up to 1 m, rosettes 2–3 m in diameter, 1–2 m tall. *Leaves* narrowed towards base, narrowly oblanceolate, rigidly spreading to slightly reflexed, 1–2 × 0.3 m, light green to (more commonly) dark grey-green; surfaces smooth; mature leaves without marginal teeth, young leaves with few minute teeth; apical spine conical to subulate, 30–50 mm long, brown to grey. *Inflorescence* paniculate, 4–9 m tall, with up to 40 umbellate side branches in upper half of peduncle; bulbils borne in axils after flowering. *Flowers* yellow, 55–65 mm long. *Perianth* with tepals equal in length, cucullate at tip, 17–18 mm long. *Stamens* epipetalous; filaments subulate, 60–90 mm long; anthers yellow, 30–40 mm long. *Ovary* green, oblong-ovoid to globose, broadly trigonal, 6-grooved, sessile, 30–45 mm long; style filiform, at length

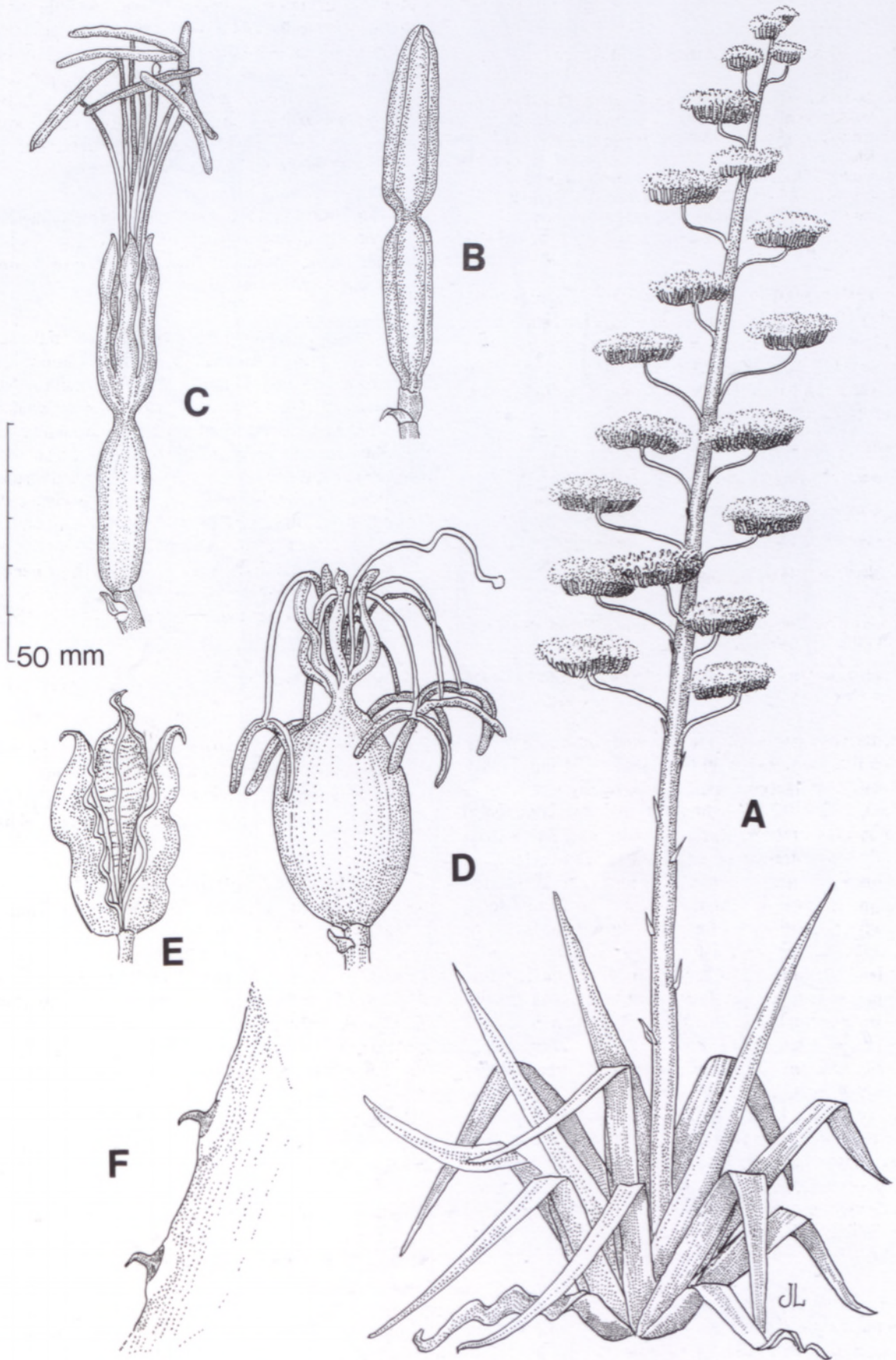


FIGURE 3.—*Agave americana*: A, habit, inflorescence 7m tall; B, bud, $\times 1$; C, protandrous flower in male phase, $\times 1$; D, developing fruit, $\times 1$; E, dry capsule, $\times 1$; F, leaf margin showing recurved teeth, $\times 1$. All drawings made from live material collected by G. F. Smith and E. J. van Jaarsveld, deposited under G. F. Smith 241 (PRE). Artist: Jeanette Loedolff.

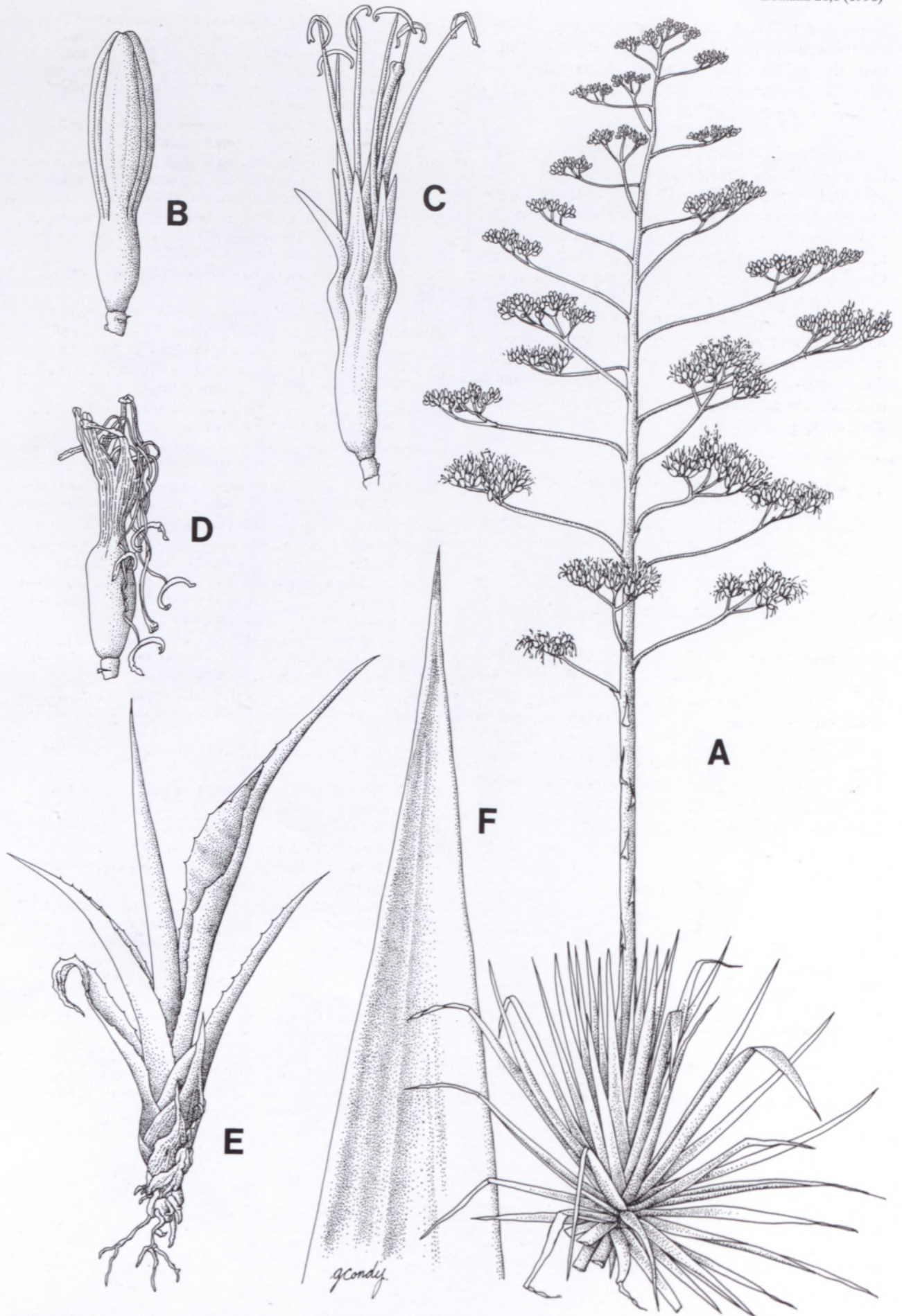


FIGURE 4.—*Agave sisalana*: A, habit, inflorescence 7m tall; B, bud, $\times 1$; C, protandrous flower in male phase, $\times 1$; D, wilted flower, $\times 1$; E, plantlet formed on side branch of inflorescence (note small teeth on leaf margin), $\times 1$; F, terminal portion of leaf (note entire leaf margin), $\times 1$. All drawings made from live material deposited under G. Condy & G. F. Smith 1 (PRE). Artist: Gillian Condy.

longer than filaments; stigma capitate, minute, apical, becoming well exerted, usually considerably exceeding anthers after anthesis. *Capsule* and *seeds* generally lacking. *Chromosome numbers*: $2n = 149, 150$ (Granick 1944; Banerjee & Sharma 1987).

A. sisalana is a sexually sterile clone, probably of hybrid origin. This is demonstrated by its inability to produce seed and its pentaploid chromosome complement (Granick 1944; Gentry 1982). Although Gentry (1982: 628, 630) argues that *A. sisalana* might have been introduced to various parts of the world from the Mexican state of Chiapas (the small towns from Cintalapa to Chiapa), its origin remains uncertain. Gentry (1982: 634) lists a number of *A. sisalana* exsiccatae, many of them having been collected from areas to which the 'species' has been introduced. Agave fibre industries—based primarily on this species—were developed in the Philippines and Indonesia in the previous century, and more recently in East Africa (Doughty 1937, 1938; Gentry 1982). Figure 4.

Voucher: *G. Condy & G. F. Smith 1* (PRE).

Icones: Doughty: fig. 2 (1937); Gentry: fig. 22.9 (1982).

Common names: English: hemp plant, sisal, sisal hemp. Afrikaans: garingboom.

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