



Fig. 26. Collecting plant material for deposition in a herbarium. (Picture by SANBI)

Other relevant data should also be recorded on field labels, in collecting books or in portable electronic data-capturing devices, where possible. Essential information includes: Name of collector, date of collection and where it was collected (with map or GPS coordinates). Other useful information includes: altitude, aspect, vegetation type, geology, soil type, abundance (frequent or rare), plant size and height, stem diameter as well as details that may be lost upon drying, such as flower or fruit colour, presence and colour of sap or latex and scent (Victor *et al.*, 2004). It is not always possible to collect all this information but at the very least where, when and by whom the plant was collected should be recorded.

5.4.2. Preparation and pressing

While preparing a specimen of a herbaceous plant is reasonably straightforward, the same is not true for succulents, which are often bulky specimens. For a specimen of a succulent to be useful to taxonomists and other researchers it has to be handled and pressed correctly (Bridson & Forman, 1998; Victor *et al.*, 2004). Unlike other plants, many succulents have to be treated before pressing (Smith, 1991; Egli & Leuenberger, 1996; Burgoyne & Smith, 1998).

After collecting, field presses and/or paper bags containing succulents should be put in a freezer at c. -4°C for 24 hours (smaller plants require less time in the freezer) (Leuenberger, 1982; Burgoyne & Smith, 1998, and references therein).

The specimens should then be placed in a microwave for a period of 1–5 minutes (depending on the size of the specimen), a few at a time (though bundles should not exceed 50 mm in thickness), or larger plants on their own, at 80% power, which leaves them pliable and easy to manipulate (Burgoyne & Smith, 1998).



Fig. 27. Plant presses with specimens drying in the sun during a field collecting expedition. (Picture by SANBI)

Other methods for removing succulent plant tissues involve scraping out of inner plant tissues, or dipping plants in boiling water or organic liquids. The method described above, however, causes the cells to burst, allowing the resulting watery substance to simply be poured off (Burgoyne & Smith, 1998). Specimens should be removed from the microwave once they turn a dull green, at which point they are ready to be dried in a plant press. Note, however, that microwaving a specimen can yield it useless in further studies that require the removal of small sections of material for chemical or molecular analyses. The accompanying specimen label should therefore indicate whether material was microwaved. Many taxonomists actively discourage the use of a microwave oven in pre-treating specimens and prefer other less destructive methods when removing moisture from material intended for depositing in a herbarium.

Plants should be arranged in the press in such a way as to provide the most information to the user. All plant parts should be shown clearly, both sides of a leaf should be visible and the curling of leaves should be avoided. Attaching a jeweller's tag conveying the collector's name and collection number to the specimen will ensure that the specimen can eventually be associated with the correct field notes compiled by the collector.

The plant press should be packed in the correct sequence as follows (from Victor *et al.*, 2004):

1. The wooden lattice frame
2. Corrugated cardboard or aluminium ventilator (corrugations run parallel to the short side)
3. Two sheets of drying paper (newspaper, cut to size, works well and is inexpensive)
4. Flimsy (thin, strong, slightly absorbent paper, such as unprinted newspaper) containing a specimen
5. Two sheets of drying paper, followed by flimsy containing a specimen
6. A ventilator after each 5–8 specimens, or after every second specimen, if the material is very bulky
7. Finish with a ventilator and the other wooden lattice frame

The drying process should not take place in too hot an environment and 45°C is considered ideal (Victor *et al.*, 2004). Damp drying paper should be changed daily for about the first week after which longer intervals can be allowed, unless atmospheric humidity is very high. Damp cardboard ventilators should also be changed and care should be taken that flimsies, though not requiring changing, do not adhere to the specimens (Victor *et al.*, 2004). A simple and rapid technique for drying damp newspaper flimsies and cardboard when out in the field is to spread these around on the dry ground in full sun securing them with stones. On sunny days they can be fully dried in 30 minutes or less.

5.4.3. Mounting and identification

At this point in the process specimens are usually handed over to experts as identification and mounting is done by herbarium staff. For more detailed information on the mounting of specimens please refer to Victor *et al.* (2004). Here we give a brief description of the process.

In the herbarium, the specimen is identified, a label is written, and these are then neatly arranged on a white mounting board (300–400 g and 270 × 420 mm) with the label in the lower right hand corner. Labels usually display at a minimum the unique collecting number, date and place of collection, the collector's name, the species and family names, and who determined (identified) the species. Specimens and plant parts are fixed to mounting boards with any or a combination of the following: envelopes, glue, strapping (strips of white, gummed or self-adhesive paper) or stitching.

Plant specimens may last indefinitely if they are properly prepared and cared for, kept away from water and protected against humidity and pests. In this regard it should be noted that all mounting sheets and paper used for preparing specimens and labels should be of archival quality. The same applies to the ink used for producing the labels. Each specimen is a permanent record of the occurrence of a species in time and space (Carter *et al.*, 2007) and in this way immortalises the collector, who contributes to the wealth of knowledge held in herbaria to be used by future generations of plant enthusiasts (Burgoyne & Smith, 1998).

6. Invasive succulent plants

AGAVACEAE Dumort.

(Century plant family; *Garingboomfamilie*)

by

G.F. Smith

Robust, monocarpic, usually rosulate perennials arising from a short rhizome or short, erect caudex. **Stem** commonly with monocotyledonous type secondary growth. **Leaves** usually crowded in basal rosette or perched at top of stem, stiff, leathery to succulent, amplexicaul, persisting for many years, margins heavily armed or saw tooth-like; each vascular bundle with well-developed fibrous cap at phloem pole. **Inflorescence** terminal, tall, fast-growing, terminating in a panicle or spike-like panicle, often massive. **Flowers** bisexual, regular or somewhat irregular, tubular, pedicellate, 3-merous 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** inferior or superior (tribe Yuccaceae), 3-locular, with septal nectaries; placentation axile; ovules in 2 vertical rows in each locule; style terminal; stigma 3-lobed. **Fruit** a loculicidal capsule or indehiscent berry. **Seeds** many, flattened, black.

References: Cronquist (1981), Dahlgren *et al.* (1985), Pedley & Forster (1986), Bogler & Simpson (1995), Verhoek (1998), Smith (2000), Reveal & Hodgson (2002), Smith (2003); Govaerts *et al.* (2009).

The Agavaceae (sometimes included in a broadly conceived Asparagaceae) is a medium-sized family consisting of c. 300 species of mostly leaf succulents from the New World, particularly Mexico, the southern United States of America, Caribbean Islands, Central America and northern South America (García-Mendoza, 1998). Eight genera are included in the Agavaceae: *Agave* L., *Beschorneria* Kunth, *Furcraea* Vent., *Hesperaloe* Engelm., *Manfreda* J.H.Salib., *Polianthes* L., *Prochnyanthes* S.Watson, *Yucca* L. [including *Hesperoyucca* (Engelm.) Baker, a genus sometimes treated as monotypic].

The family is mostly adapted to desert-like conditions, and the vast majority of the species will survive under severe environmental conditions, particularly aridity and low temperatures, but they also do well in tropical and subtropical areas. Not surprisingly therefore, representatives of the family are widely naturalised in southern tropical Africa, Australia and Mediterranean Europe, among other places (Smith, 1997; Smith & Figueiredo, 2007; Smith & Van Wyk, 1999). Most species remain herbaceous, some becoming quite massive, with only a few attaining pronounced, tree-like dimensions and appearing to be 'woody'. Many representatives are rhizomatous, proliferating through basal suckers or from leaf axils (Smith, 2006b).

Flowers are tubular or campanulate, erect or dangling, lantern-like and clustered into racemes or panicles. However, in contrast to their lilioid look-alikes (for example

aloes), the flowers of which all have superior ovaries, the flowers of representatives of only one group within the Agavaceae, the tribe *Yuccaeae*, consistently show this trait. In contrast, representatives of the tribe *Agaveae* all have inferior ovaries. Most species of the most speciose genus, *Agave*, as well as species of *Furcraea*, are monocarpic multiannuals that die after having flowered, usually after many years. However, most proliferate through basal or stem suckers, so perpetuating genetically identical offspring of the dying rosettes. These sprouts will in many instances form dense colonies that can preclude natural vegetation where they become established. Several species produce bulbils on their inflorescences, often during, but mostly immediately after, flowering is complete. These drop from the inflorescence and will easily strike root where they fall.

Much has been written about the human-agave interface, and representatives of the genus have provided an astonishing range of products that have been used since ancient times. For example, some species are useful as sources of fibre (including *Agave sisalana* Perrine and *A. fourcroydes* Lem.), while liquors such as tequila (produced from *A. tequilana* F.A.C.Weber in certain states of Mexico) and mescal are produced from others (for example *A. colorata* Gentry).

A total of eight species from two genera of the Agavaceae are naturalised in southern Africa.

Key to the two naturalised genera:

1. Flowers erect; perianth segments fused into a tube below the middle; filaments and style not swollen; bulbils plant-like.....**Agave**
- 1'. Flowers pendulous; perianth segments \pm free; filaments swollen at base and style base dilated, bulbils globular. **Furcraea**

Agave L.

Robust, monocarpic, usually rosulate, multi-annual 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. **Inflorescence** apical, tall, fast-growing, terminating in a panicle, often massive. **Flowers** bisexual, regular or somewhat irregular, tubular, pedicellate, 3-merous throughout. **Perianth** yellow or greenish, often with a reddish or brownish tint, petaloid, 3 + 3, often fleshy, united below to form a tube. **Stamens** 3 + 3, epipetalous; anthers mostly dorsifixed, introrse, versatile opening by longitudinal slits, linear to oblong. **Ovary** inferior, 3-locular, with septal nectaries; placentation axile; ovules in 2 vertical rows in each locule; style terminal; stigma 3-lobed. **Fruit** a loculicidal capsule. **Seeds** many, flattened, black.

References: Berger (1915), Standley (1920), Bailey (1958), Gentry (1972, 1978, 1982), Webb (1980), Espejo Serna & López-Ferrari (1993), Smith & Mössmer (1996), Irish & Irish (2000), Smith (2000), Thiede (2001), Smith (2006), Smith & Klopper (2007), Smith *et al.* (2008).

In terms of number of included species, c. 200, the genus *Agave* is the largest of the agavoid genera. *Agave* is a well known succulent plant genus of the New World being indigenous to Mexico, Central America, northern South America and the southern United States of America, as well as the West Indies. Representatives of the genus have been cultivated in southern Africa for several centuries, in both amenity and domestic horticulture. Two species have been used locally in agriculture, *Agave americana* as cattle fodder, and *A. sisalana* for fibres for use in rope making, for example.

To most people, some species of *Agave*, are best known as the source of sisal fibre and the alcoholic beverage tequila. A reversion to the beauty and practicality of natural fibres, has made carpets made from the near-indestructible sisal fibres essential products in modern interiors. On the other hand, two cocktails in particular, tequila sunrise and margaritas, of which especially the latter has produced numerous variations, contributed immensely to the current global popularity of tequila, which is essentially a type of mescal. Tequila is produced exclusively from *A. tequilana* F.A.C.Weber [nowadays sometimes referred to as *A. angustifolia* Haw. subsp. *tequilana* (F.A.C.Weber) A.G.Valenzuela-Zapata & G.P.Nabhan cultivar *azul*]. In addition, to be legally called tequila, the *Agave tequilana* 'pineapples' from which it is distilled must be harvested and produced in Mexico in one of five approved regions in the country: the entire state of Jalisco, and certain villages in the states of Nayarit, Tamaulipas, Michoacán, and Guanajuato.

Rosettes of most *Agave* species that produced a flowering pole will die. However, this does not mean the end of a specimen, as many species are proliferous through basal or stem suckers. These suckers will in many instances form dense colonies that can preclude natural vegetation where they become established. The leaves of species of *Agave* are usually crowded near the base of the plants into a sessile rosette, stiff, fleshy and armed with vicious teeth at their tips and along their margins. Smooth leaf-margined species are rare in *Agave*. In the very few species common in cultivation that have a true stem, for example *A. attenuata* Salm-Dyck, leaves are crowded near the tips of the stems.

Given that some *Agave* species are widely cultivated in southern Africa, they have been known to be problem plants locally for several decades (Wells, 1986).

Key to the *Agave* taxa naturalised in southern Africa:

- | | | |
|-----|---|--|
| 1. | Leaf margins devoid of teeth | 5. <i>Agave sisalana</i> |
| 1'. | Leaf margins armed with small or large, sharp teeth | 2 |
| 2. | Leaves distinctly light blue to glaucous green | 3 |
| 2'. | Leaves light- to dark green, never blue | 4 |
| 3. | Marginal leaf teeth inconspicuous, small, usually the same colour as the leaf surface | 4. <i>Agave celsii</i> var. <i>albicans</i> |
| 3'. | Marginal leaf teeth prominent, usually brown | 5 |
| 4. | Plants solitary | 7. <i>Agave wercklei</i> |
| 4'. | Plants proliferous from the base | 6 |

5. Leaves often drooping to one side; plants massive
 **1. *Agave americana* subsp. *americana* var. *americana***
- 5'. Leaves erect to stiffly spreading; plants medium-sized to large
 **2. *Agave americana* subsp. *americana* var. *expansa***
6. Leaves dull green, armed with short, brown teeth; mid-rosette leaves spreading, closely packed on stem
 **3. *Agave angustifolia* var. *angustifolia***
- 6'. Leaves dark green, armed with prominent, greenish brown teeth; mid-rosette leaves erect, widely spaced on stem
 **6. *Agave vivipara* var. *vivipara***

1. *Agave americana* L. subsp. *americana* var. *americana*

In: *Species plantarum* 1: 323 (1753a).

=*Agave complicata* Trel. ex Ochot.
 =*Agave felina* Trel.
 =*Agave gracilispina* Engelm. ex Trel.
 =*Agave melliflua* Trel.
 =*Agave rasconensis* Trel.
 =*Agave subzonata* Trel.
 =*Agave zonata* Trel.

Common names: agave, American agave, American aloe, century plant (English); Amerikaanse aalwee, Amerikaanse aalwyn, blou-aalwee, blougaringboom, gareboom, garingboom, kaalgaarboom, makaalwyn (Afrikaans); lekhalala (Sotho).

Large to massive, acaulescent or short-stemmed, monocarpic, rosulate, perennial, leaf succulent; rosettes up to 2 m tall, profusely proliferous through basal suckers. **Leaves** erect at first, becoming spreading to reflexed, flopping over to one side, lanceolate, 1–2 m long, light blue; margins armed with numerous, straight to flexuose or variously recurved, simple teeth, up to 1 cm long; apical spine conical to subulate, 3–5 cm long. **Inflorescence** paniculate, 5–9 m tall, branched, never bulbiferous. **Flowers** erect, 7–10 cm long, yellow to greenish yellow. **Stamens** with filaments 6–9 cm long; anthers 3–3.6 cm long, centric to excentric, yellow. **Fruit** a capsule, oblong, 4–5 cm long. **Seed** lunate to lacrimiform, 7–8 × 5–6 mm, shiny black. **Distribution:** B, L, S, SA. (Fig. 28).

References: Berger (1915), Gentry (1982), Pedley & Forster (1986), Couper & Cullen (1988), Smith & Mössmer (1996).

This large, almost invariably blue-leaved century plant (Fig. 29), grows to massive dimensions and is very widespread in southern Africa. Unlike those of *Agave americana* var. *expansa*, the leaves of the typical variety usually droop to one side (Fig. 30). Several names have been applied to variants of this species, but none are nowadays upheld (see for example Ochoterana, 1913; Trelease, 1914, 1920).

It has been proposed that the species was introduced into South Africa as discarded ship's ballast, and into local horticulture as an ornamental. It spreads easily from suckers produced from the base to form large clumps. Flowers of the species are

pickled and sold as a savoury delicacy (Fig. 31). Physical removal seems to be the best way of eradicating plants.

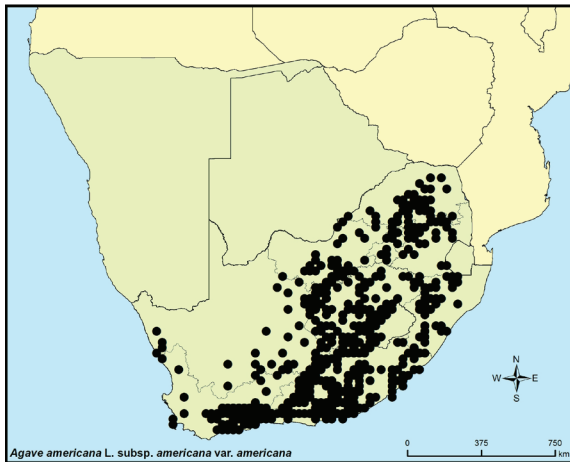


Fig. 28. Distribution map of *Agave americana* L. var. *americana*.



Fig. 29. A population of blue-leaved *Agave americana* L. var. *americana*. (Picture by Gideon F. Smith)



Fig. 30. Leaves of *Agave americana* L. var. *americana* usually droop to one side.
(Picture by Neil R. Crouch)

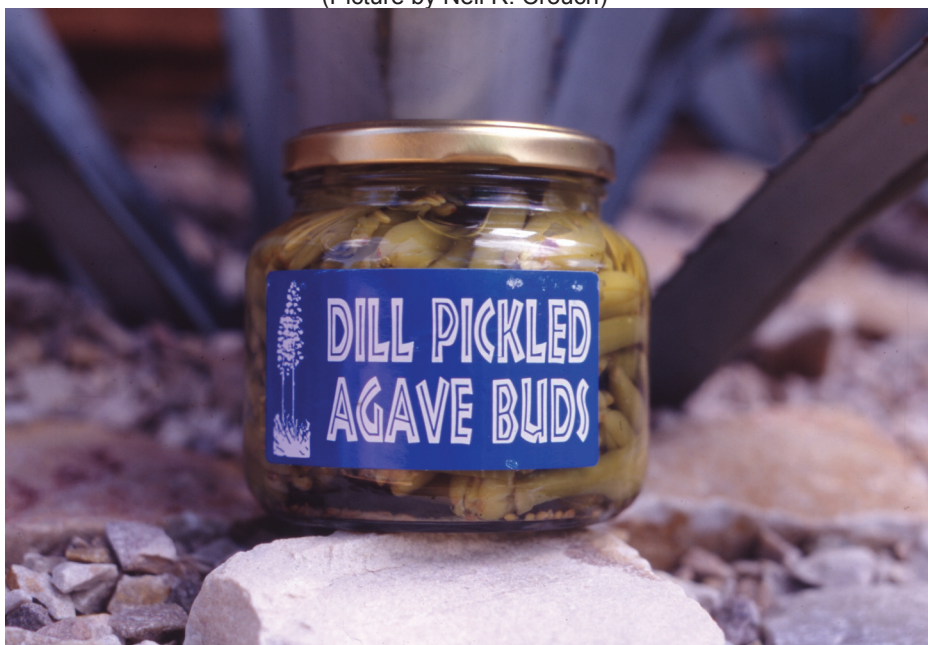


Fig. 31. Pickled flowers of *Agave americana* L. var. *americana* are sold as a savoury delicacy. (Picture by Gideon F. Smith)

2. *Agave americana* L. subsp. *americana* var. *expansa* (Jacobi) Gentry

In: *The agave family in Sonora*, Agriculture Handbook No. 399: 80–84 (1972).

=*Agave abrupta* Trel.

=*Agave expansa* Jacobi

Common names: spreading century plant (English); skraalblougaringboom, skraalgaringboom (Afrikaans).

Large to massive, acaulescent or short-stemmed, monocarpic, rosulate, perennial, leaf succulent; rosettes up to 2 m tall, profusely proliferous through basal suckers.

Leaves remaining erect, not spreading or reflexed, never flopping over to one side, lanceolate, 1–2 m long, light blue; margins armed with numerous, straight to flexuous or variously recurved, simple teeth, up to 1 cm long; apical spine conical to subulate, 3–5 cm long. **Inflorescence** paniculate, 5–9 m tall, branched, never bulbiliferous. **Flowers** erect, 7–10 cm long, yellow to greenish yellow. **Stamens** with filaments 6–9 cm long; anthers 3–3.6 cm long, centric to excentric yellow. **Fruit** a capsule, oblong, 4–5 cm long. **Seed** lunate to lacrimiform, 7–8 × 5–6 mm, shiny black. **Distribution:** SA. (Fig. 32).

References: Gentry (1982), Forster (1986), Irish & Irish (2000), Thiede (2001), Reveal & Hodgson (2002), Vásquez-García *et al.* (2007), Reveal & Hodgson (2009).

Unlike the typical variety of the species, the leaves of plants of *Agave americana* var. *expansa* remain erect (Fig. 33, 34) and generally have a neater appearance. However as in the case of the *Agave americana* var. *americana* the flowering pole can reach a height of 8 m (Fig. 35). It is therefore likely that *Agave americana* var. *expansa* was introduced for its greater horticultural appeal as a much tidier-looking version of the typical variety (Jacobi, 1868). This variety is known to have become established in the Western Cape Province of South Africa, where it is grown as an architectural plant in large gardens on the Cape Peninsula. It is increasingly appearing in gardens and along roadsides beyond the Mediterranean climate parts of South Africa.

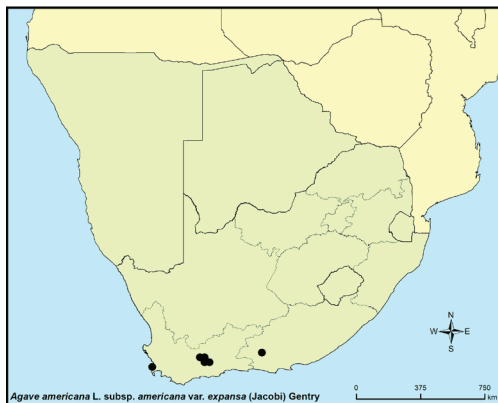


Fig. 32. Distribution map of *Agave americana* var. *expansa* (Jacobi) Gentry.



Fig. 33. Leaves of *Agave americana* var. *expansa* (Jacobi) Gentry tend to remain erect. (Picture by Gideon F. Smith)



Fig. 34. Close-up of the leaves of *Agave americana* var. *expansa* (Jacobi) Gentry.
(Picture by Gideon F. Smith)



Fig. 35. Inflorescence of *Agave americana* var. *expansa* (Jacobi) Gentry.
(Picture by Gideon F. Smith)

3. *Agave angustifolia* Haw. var. *angustifolia*

In: *Synopsis plantarum succulentarum*: 72 (1812).

=*Agave owenii* I.M.Johnst.

=*Agave pacifica* Trel.

=*Agave yaquiana* Trel.

Common names: kleingaringboom (Afrikaans).

Medium-sized, caulescent, monocarpic, rosette, perennial, leaf succulent; rosettes up to 1.2 m tall, proliferous through basal suckers. **Leaves** ascending to horizontal in mid-rosette, linear to narrowly lanceolate, 0.6–1.2 m long, light green to glaucous grey; margins armed with small teeth, curved or variously flexed, 2–5 mm long; apical spine conical to subulate, 1.5–3.5 cm long. **Inflorescence** paniculate, 3–5 m tall, branched, usually bulbiliferous. **Flowers** erect, 5–6.5 cm long, green to yellow. **Stamens** with filaments 3.5–4.5 cm long; anthers centric or excentric, 2–3 cm long, yellow. **Fruit** a capsule, ovoid, 3–5 cm long. **Seed** D-shaped, 9–12 × 7–8 mm, dull black. **Distribution:** SA. (Fig. 36).

References: Gentry (1982), Forster (1987–1988), Espejo Serna & Lopez-Ferrari (1993), Colunga-García Marín & May-Pat (1997), Steyn & Smith (2000).

With its fairly thin, flattish leaves densely arranged into medium-sized rosettes (Fig. 37), *Agave angustifolia* is a distinctive species that is slowly spreading into natural vegetation in South Africa. The leaves are armed with vicious marginal and terminal spines (Fig. 38). Clones established in southern Africa produce thousands of bulbils (Fig. 39) on their inflorescences (Fig. 40) and have the potential to become a real menace. Little is known about its introduction into the country.

Several names previously proposed for variants of *Agave angustifolia* are no longer upheld. Only three, *Agave pacifica* Trel., *A. yaquiana* Trel. and *A. owenii* I.M.Johnst. are listed here as possibly being applied to the species in South Africa (Trelease, 1920; Johnston, 1924).



Fig. 36. Distribution map of *Agave angustifolia* Haw.



Fig. 37. Dense, medium-sized rosettes of *Agave angustifolia* Haw.
(Picture by Geoff R. Nichols)



Fig. 38. Leaves of *Agave angustifolia* Haw. armed with spines.
(Picture by Geoff R. Nichols)



Fig. 39. Bulbils on the inflorescence of *Agave angustifolia* Haw.
(Picture by Geoff R. Nichols)



Fig. 40. Inflorescence of *Agave angustifolia* Haw. (Picture by Neil R. Crouch)

4. *Agave celsii* Hook. var. *albicans* (Jacobi) Gentry

In: *Agaves of continental North America*: 223-224, f. 9.1-9.3, 9.7, t. 9.1 (1982).

=*Agave albicans* Jacobi

Common names: vaalgaringboom (Afrikaans).

Medium-sized to large, acaulescent or short-stemmed, rosette, leaf succulent, perennial through proliferous axillary branching; rosettes up to 0.8 m tall. **Leaves** erect at first, becoming spreading to slightly reflexed, stout, cymbiform to somewhat lanceolate, 0.4–0.6 m long, light blue; margins armed with numerous weak, straight, recurved, simple or bicuspid teeth, up to 3 mm long; apical spine obsolescent. **Inflorescence** spicate, unbranched, 1.5–2.5 m tall, never bulbiliferous. **Flowers** erectly spreading, 5–6 cm long, basal part light green, tube creamy green with metallic lavender tinge. **Stamens** with filaments 7–8 cm long; anthers centric, 2 cm long, lavender when young, yellowish when mature. **Fruit** a capsule, ovoid-angular, 1.8–2.8 cm long. **Seed** hemispherical, 5 × 3 mm, black. **Distribution:** SA. (Fig. 41).

References: Irish & Irish (2000), Smith & Steyn (2002b).

The nomenclatural history of *Agave celsii* var. *albicans* is quite complex and recently it has been suggested (see for example Thiede, 2001) that the correct name of this taxon is *Agave mitis* Mart. var. *albidior* (Salm-Dyck) Ullrich. For the moment the variety is here treated under the name proposed by Gentry (1982).

The medium-sized rosettes consisting of numerous blue-green to almost white leaves (Fig. 42), as well as the unbranched inflorescences (Fig. 43), separate the taxon from other agaves naturalised in southern Africa. It is the least noxious of the problem agaves in South Africa, and can be easily eradicated by physical removal.

The species was probably introduced as a horticultural subject, and with its interesting leaf colour it is easy to see why.

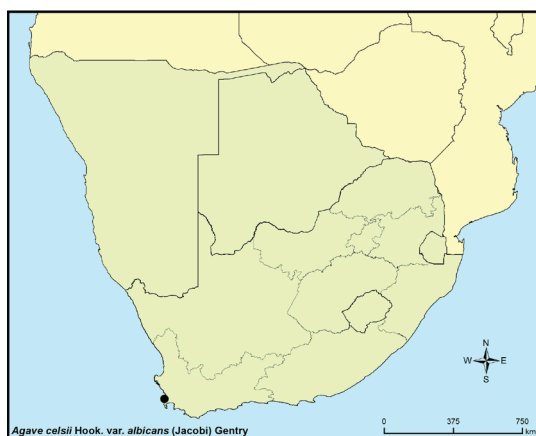


Fig. 41. Distribution map of *Agave celsii* Hook. var. *albicans* (Jacobi) Gentry.



Fig. 42. Blue-green leaved rosettes of *Agave celsii* Hook. var. *albicans* (Jacobi)
Gentry develop into dense clumps. (Picture by Gideon F. Smith)



Fig. 43. Unbranched inflorescence of *Agave celsii* Hook. var. *albicans* (Jacobi) Gentry.
(Picture by Gideon F. Smith)

5. *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).

Common names: hemp plant, sisal, sisal hemp (English); garingboom, sisal (Afrikaans).

Medium-sized to large, acaulescent or short-stemmed, monocarpic, rosulate, perennial, leaf succulent; rosettes up to 2 m tall; profusely proliferous through elongated rhizomes. **Leaves** erect throughout, lanceolate, 0.9–1.3 m long, dark green; margins generally lacking teeth; apical spine subulate, 2–2.5 cm long. **Inflorescence** paniculate, branched, 4–9 m tall, profusely bulbiliferous. **Flowers** erect, 5.5–6.5 cm long, greenish yellow. **Stamens** with filaments 5–6 cm long; anthers centric, 2.3–2.5 cm long, yellow. **Fruit** a capsule, generally lacking; plants sterile. **Seed** generally lacking. **Distribution:** SA. (Fig. 44).

References: Perrine (1838b), Trelease (1913), Berger (1915), Gentry (1982), Pedley & Forster (1986), Couper & Cullen (1988), Smith & Mössmer (1996).

Agave sisalana can hardly be confused with any of the other agaves naturalised or cultivated in southern Africa. The leaves are generally mid- to dark green and their margins are devoid of teeth (Fig. 45, 46).

The strong fibres extracted from the leaves of *Agave sisalana* have been widely used in weaving, and for manufacturing carpets and ropes (Fig. 47). It was therefore

introduced as an agricultural crop and planted in vast numbers in plantations, particularly in areas that receive marginal rainfall (Fig. 48, 49). Once plants flower they produce thousands of bulbils (Fig. 50) on the side branches of the flowering pole, and sometimes also from the large bracts on the pole itself. These are easily transported and will strike root where they drop. These perfectly formed plantlets have been carried far and wide leading to the establishment of sparse or dense clusters of plants in many parts of the sub-region. It rates as one of the most invasive of the agaves naturalised in South Africa (Fig. 51).

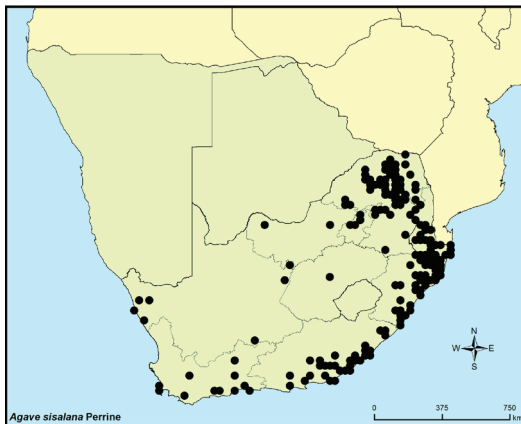


Fig. 44. Distribution map of *Agave sisalana* Perrine.



Fig. 45. Mid- to dark green leaves of *Agave sisalana* Perrine.
(Picture by Helmuth G. Zimmermann)



Fig. 46. Leaves of *Agave sisalana* Perrine do not have marginal spines.
(Picture by Gideon F. Smith)



Fig. 47. Fibres of *Agave sisalana* Perrine collected for use in weaving.
(Picture by Neil R. Crouch)



Fig. 48. Plantation of *Agave sisalana* Perrine from which leaves have been harvested. (Picture by Neil R. Crouch)