



Guide to the identification of
succulent plant species
included by South Africa in
Appendix III
of the Convention on
International Trade in
Endangered Species of Wild Fauna and Flora
(CITES)

T. Variawa, M.F. Pfab & L. Jabar



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Contents

Acknowledgments	iv
Preface	v
Photo credits	vi
Overview	1
Trade in succulent plants	1
CITES Appendix III	1
Characteristics of succulent plants	2
Characteristics of wild-collected and artificially propagated (succulent) plants	2
Artificially propagated plant material	3
Wild-collected plant material	3
Artificially propagated plants – examples	4
Wild collected plants – examples	5
Species descriptions	6
<i>Adenia spinosa</i>	8
<i>Conophytum</i> species	12
<i>Crassothonna clavifolia</i>	16
<i>Mestoklema tuberosum</i>	20
<i>Monsonia herrei</i>	24
<i>Monsonia multifida</i>	28
<i>Monsonia patersonii</i>	32
<i>Othonna armiana</i>	36
<i>Othonna cacalioides</i>	40
<i>Othonna euphorbioides</i>	44
<i>Othonna retrorsa</i>	48
<i>Pelargonium crassicaule</i>	52
<i>Pelargonium triste</i>	56
<i>Portulacaria pygmaea</i>	60
<i>Raphionacme zeyheri</i>	64
<i>Tylecodon bodleyae</i>	68
<i>Tylecodon nolteei</i>	72
<i>Tylecodon reticulatus</i>	76
References and further reading	80
Basic structure of plants and plant parts	81
Glossary of terms	82
Appendices	90
Appendix 1: Northern Cape Nature Conservation Act No. 9 of 2009	90
Appendix 2: Western Cape and Eastern Cape Nature and Environmental Conservation Ordinance No. 19 of 1974	92

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Preface

Illegal and unsustainable trade in wildlife species poses a significant threat to some of the planet's rare and irreplaceable biological resources. Plants are the most traded taxonomic group, with timber-producing tree species, orchids and other collectable plants, such as cycads, cacti and succulents, all adversely affected by illegal trade to meet a global demand.

Southern Africa is a region rich in biodiversity. South Africa is amongst the most biodiverse countries in the world and is rated among the top ten for plant species diversity. Three of the world's 36 biodiversity hotspots fall largely or entirely within South Africa's borders, including the Succulent Karoo, which is one of only two arid hotspots in the world and the most diverse semi-arid ecosystem on the planet. Many rare and endemic species of plants are found in the Succulent Karoo. Plants in this unique region of the world have come under increased pressure from large-scale illegal collection to supply a growing international demand for ornamental plants. Although many species are available in cultivation, there are still numerous species that have not yet been artificially propagated in sufficient numbers to meet demand and remain rare on the international market. Wild plants are consequently

becoming increasingly prevalent in trade, largely in contravention of local conservation laws and international trade regulations. This trade has severely impacted many endemic species and has also fostered negative socioeconomic outcomes. Online platforms, including social media, have and continue to play a key role in facilitating this illicit trade, and a global surge in demand for certain taxa can quickly eradicate wild populations. To date, hundreds of thousands of illegally harvested wild succulent plants have been confiscated in South Africa and many more have likely been smuggled out of the country over the last four years. To urgently address this growing problem, South Africa requested the CITES Secretariat to include 17 succulent plant species and one succulent plant genus in Appendix III of CITES.

One of the key challenges in regulating and enforcing CITES trade provisions is the difficulty of detecting and identifying species in trade. This guide aims to provide an identification tool to assist law enforcement and border officials to identify the succulent plant species included by South Africa in Appendix III of CITES and to differentiate between wild-collected and artificially propagated specimens.

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Overview

Trade in succulent plants

Succulent plant species are highly prized amongst both amateur and specialist collectors of unique and exotic ornamental plants. Succulent plants have been cultivated in private and conservation collections for more than 200 years with large quantities of plants and seeds harvested from the wild between the late 1800s and early 1990s. Presently, markets around cultivated succulents exist across the globe, mainly in Europe and the United States of America, and many unique species, which may have once been rare, are now commercially available to consumers. At the same time, the regulation of harvest and trade had seen an improvement over the years due to stronger local and international conservation legislation. Nevertheless, wild collection of rare and newly described species is an ongoing practise by both private collectors and nurserymen looking to satiate a demand for specimens collected at type localities, as well as dainty houseplants. New markets are emerging, particularly across East Asia, with many African countries now involved in the supply of plants, largely from the wild. Numerous species of succulent plants continue to be transported around the world, mostly by airfreight or by post, to be sold to plant traders or to enthusiasts for cultivation. Plants are often traded as seed or as live specimens within pots, but mostly as non-potted specimens (including bare stems or cuttings) wrapped in newspaper to prevent damage.

CITES Appendix III

The inclusion of 17 succulent plant species and one succulent plant genus (including all parts and derivatives) in Appendix III of CITES came into effect on 23 February 2023. The listing signifies South Africa's request to other CITES Parties for assistance in controlling trade in these species.

These species may only be exported from South Africa upon presentation of a CITES export permit, which will only be granted if the plants were obtained in compliance with relevant domestic legislation. Imports from South Africa will require the presentation of an export permit, while imports from any other



country will require the presentation of a certificate of origin or a certificate of re-export as circumstances prescribe. Accompanying recommendations, guidance and interpretation of the Convention text can be found on the CITES website (<https://www.cites.org>).

Characteristics of succulent plants

Succulents are plants with parts that are thickened, fleshy and engorged, most often for purposes of retaining water in arid climates or soil conditions. The word 'succulent' comes from the Latin word *sucus*, meaning 'juice' or 'sap', referring to the water stored in various organs of the plants such as their leaves and stems, as well as roots. Geophytes that survive unfavourable periods by dying-back to underground storage organs, like bulbs, may be regarded as marginally succulent. The adaptation to survive within dry environments and often under harsh conditions, has resulted in a wide diversity of succulent plant species with various shapes, sizes and colours. Owing to their unique characteristics and beauty, as well as their hardiness and relative ease of care, succulents are popular as ornamental plants amongst gardeners and plant collectors, and many species are traded widely in local and international horticultural markets.

Characteristics of wild-collected and artificially propagated (succulent) plants

Plants grown under controlled conditions show characteristics that differ from plants that grow in their natural habitat.

In nature, plants grow under conditions of stress, such as limited water and available nutrients. Plants in the wild are often damaged by diseases, herbivores and parasites. Wild plants grow under very specific conditions, often in special microhabitats, such as rock fissures or cliff sides, and they develop unique forms and shapes. Plants growing at the same locality may even appear different from one another. Shipments of wild-collected plants are typically varied, comprising plants of many different sizes and shapes. Many specimens within such shipments may show signs of damage from the harvest, as the extensive root systems and above-ground growth must be cut off when the plants are extracted from the substrate.

Nursery-grown plants in comparison are uniform in appearance and healthy, and shipments of such plants typically comprise specimens that are usually about the same age and size. They are generally carefully grown and prepared for shipment without signs of evident damage. It should be noted that whilst many species are easy to propagate, obtaining large specimens with unique characters (such as unusual shapes) is highly unlikely in cultivation.

The general defining characteristics between wild-collected and artificially propagated (succulent) plants are outlined on page 3 and have been described using various sources and input from experts, providing a quick and useful reference for law enforcement and border officials.

Identification of succulent plant species in trade can be difficult, especially in the absence of flowers and fruits. This guide cannot give a 100% guarantee of the identification of any individual plant, but it has been designed to enable the closest possible identification of individual species, as well as to enable the user to determine whether plants are artificially propagated or wild-collected. Where uncertainties arise, it is best to consult with a botanical expert.

Artificially propagated plant material

- Seedlings and small- to medium-sized plants. Caudiciform species rarely have extremely swollen, multi-branching parts.
- Uniform growth, sizes and shapes.
 - Plant parts often rigid and healthy (as opposed to shrivelled and stressed) due to being well looked after. Stems and roots of regular shapes and size.
- Without notable physical damage to plant parts.
- Typically without dry/dead parts and always with few healthy leaves (bright and vibrant) and healthy, compact roots (bare and clean) attached.
- Plants are produced in succession and specimens would be of similar sizes.
- Plants look healthy without any signs of natural damage. Leaves and stems appear uniformly green (bright) owing to a thinner cuticle or wax layer compared to 'greyish' leaves of wild plants.
- Spines less dense, finer, bright/colourful, more uniform in size and structure, unbroken.
- Plants usually cleaned of soil/dirt/pests and any other materials that may naturally be present on/around the species in the wild. Specimens may be potted in a homogenous soil mixture and unpotted specimens may have traces of peaty substrate.
- Professionally packaged plants with neat (often printed) labels, and complete documentation.

Wild-collected plant material

- Large to unusually large plants.
 - Notable are the fat/swollen parts or stems (i.e., caudices or tubers).
 - Usually with multiple, thick branching heads.
- Unusual shapes and non-uniform/irregular growth.
 - Imprints of rocks on stem bases, compressed stem shapes as a result of the growing habitat of wild plants that occur between rocks, etc., or because of harsh climatic conditions.
- Notable damage with indications of holes/dents/scars in growing stems – from natural elements or due to destructive/harsh harvest techniques.
- Usually only main body of plant present, i.e., without complete root system (and leaves in most cases). If roots and stems/leaves present, they are typically in poor condition (non-uniform, cut-back, broken or damaged, and shrivelled with discolouration).
- High degree of variation in plant sizes – wild populations comprise individuals of different ages across varying size classes, because of natural recruitment and mortality events.
- Signs of natural damage, apart from holes, may be present – stems may be blackened (by sun/fire damage) or have signs of animal and/or pest damage. If plants get burned by the sun or damaged in another manner, the formerly green epidermis of stems and leaves turns into a layer of cork.
- Spiny species are armoured with thick, fierce, often unruly spines that may be broken/withered/bleached and appear easily breakable.
- Plants may be cleaned, but, in many cases, there may be traces of habitat soil/gravel/clay and other materials (such as seed or companion plants and lichens, which occur naturally in the habitat) still attached to plant parts.
- Plants packaged unprofessionally with handwritten labels or tags that include collection numbers, dates, sites, etc. and lacking species names (i.e., genus name in combination with 'spec.', 'sp.' or 'spp.') along with missing/incomplete documentation.

Artificially propagated plants – examples

- Typically seedlings and small plants.
- Uniform sizes, colours and shapes.
- Often with healthy roots, stems and leaves.
- Healthy, undamaged plant parts (e.g., no signs of pest damage, scars, dead pieces or discolouration) and without habitat soil/organisms.
- Cleaned parts, pleasant in appearance and neatly packaged with labels.



Wild collected plants – examples

- Large plants (thickened/irregular stems).
- Varying sizes, unusual shapes.
- Without roots, stems and/or leaves.
- Damaged/dead plant parts (e.g., with holes, broken branches, pest damage, discolouration) and with habitat material attached.
- Uncleaned, unpleasing in appearance and untidily packaged.



Species descriptions



Adenia spinosa

Conservation status: Least Concern; non-endemic; indigenous to Limpopo.

Protection status: None.

Common names and synonyms: Spiny green stem; (spiny) elephant foot.

Description

A thorny, climbing shrub, growing up to 2.5 m high. The plant bears a twisted frame of thin branches, which arise from an irregularly shaped, fleshy and

bulbous caudex that can grow up to 1.5 m in diameter. Leaves are alternate and broadly egg-shaped, with noticeable veins, grey-green above and paler below; margins are smooth, although lobed (having divisions extended less than halfway to the middle of the base). Plants lose their leaves in the dry winter season, which starts in June and lasts to late August. The blunt tendrils, which are found on the branches, are modified inflorescences or young thorns that allow the branches to climb over other shrubs and into trees. Flowers are creamy yellow and grow on the upper angle between a leaf stalk (petiole) and the stem. Fruits are an ovoid (egg-shaped) capsule, divided into three segments, turning from green to yellow when ripe.

Defining characteristics

- Exceptionally large, bulbous caudex up to 1.5 m in diameter.
- With many branching, spiny stems.
- Broadly oval-shaped leaves with conspicuous venation.

**Flowering season**

Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.



Artificially propagated plant material

Small- to medium-sized stems with uniform, compact growth (shapes).



Adenia spinosa

Wild-collected plant material

Unusually large stems (> 10 cm in diameter) with misshapen growth forms, including indentations.



Adenia spinosa

Conophytum species

Conservation status:

Approximately 97% of all conophytums are threatened with extinction, and the majority of the 197 taxa are assessed as Critically Endangered or Endangered. The genus is closely associated with the winter-rainfall region of southern Africa, occurring in the Succulent Karoo biome, with many endemic taxa distributed within the Western Cape and/or Northern Cape and some taxa occurring in Namibia.

Protection status:

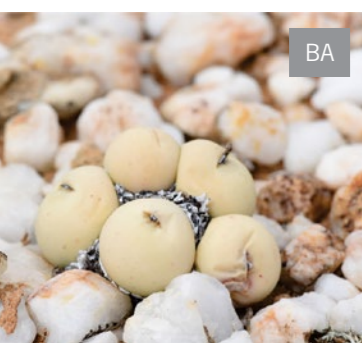
Schedule 2 (Northern Cape Nature Conservation Act No. 9 of 2009) and Schedule 4 (Nature and Environmental Conservation Ordinance No. 19 of 1974).

Common names and synonyms:

Button plants; conos; *knopies*.

Description

Conophytum is a genus of dwarf succulents comprising small, compact plants, all of which produce low mats or domes consisting of succulent, clustered, tiny leaf pairs produced from individual (largely subterranean) stem bodies. The leaves of *Conophytum* plants are plump and extremely succulent, with leaf pairs joined for at least part of their length – many species have leaves that are united only at their leaf bases, producing pairs with curiously shaped lobes. Other species have leaves that are almost completely united, with only the smallest dimple or pit separating the leaf pairs. Each leaf pair (together referred to as a body) ranges in shape from bilobed to spherical, ovoid, tubular or conical; some may even appear heart-shaped. Some species have windows in the epidermis on the top of their leaves. To the naked eye, the epidermis ranges from very smooth to slightly rough to hairy, depending on the microscopic epidermal cell shape and structure. The markings of the leaves are also highly variable, depending on the species and variety. While most species are typically of a uniform green colouration with smooth surfaces, many others are marked with darker dots, lines and textured surfaces. Like their close relatives, the *Lithops*, some species are coloured to mimic the stones in their habitats. Intense light and cooler temperatures may increase the intensity of the colouration of some species. Under the right conditions, some varieties may produce deep red and purple pigments. In their normal, natural state, each stem has only one pair of leaves at a time, though one plant may have dozens of stems and thus dozens of leaf pairs. Over time, plants of many taxa generally spread horizontally to



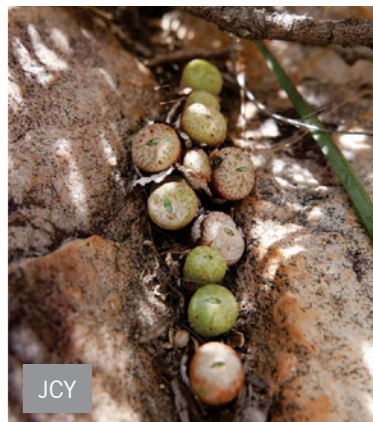
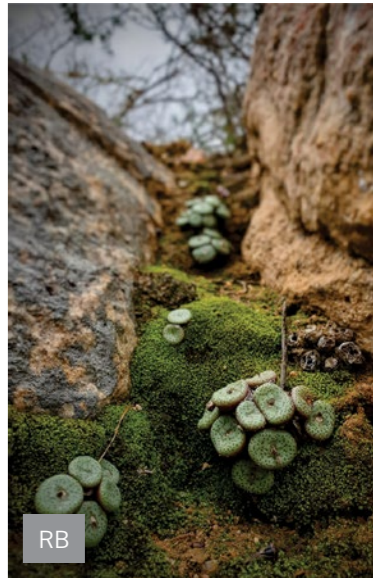
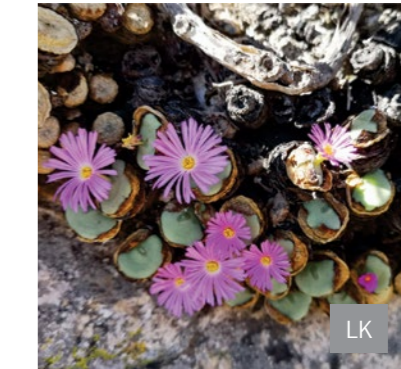
produce dense clusters of stems, which may measure many centimetres across. Conophytums produce all their growth during the rainy winter season during which new leaf pairs appear from beneath the envelope of dried tissue formed from the shrivelled remains of leaves from the previous season. After the new growth of leaves, comes the formation of brightly coloured, aster-like flowers. The flowers, while being generally small, are often brightly coloured in yellows, pinks, magenta and white, and are often bi- or even tri-coloured with petals having whitish bases, and the flowers having bright yellow/orange centres. The flowers have been described as resembling miniature shaving brushes. In some species, the flowers are produced in such numbers that it becomes difficult to see the plant bodies through the carpet of blooms. The fruit is a capsule containing many small seeds. The genus *Conophytum* is one of the most species-rich in the Aizoaceae plant family, displaying a remarkably high degree of speciation with 111 species and 86 subspecies and varieties recognised.

Defining characteristics

- Dwarf, almost stemless plants with plump, very succulent, tiny leaves growing in small dense clumps forming compact mats or domes.
- Distinguished by conically united leaves and by their petals, which are fused into a basal tube.
- Plants have a dormant phase during which they form a dry, papery, often white husk (from which new bodies emerge) that may cause the plants to appear 'dead'.
- Plants in habitat are known to spread across 60 cm or more, but in cultivation, plants are usually maintained at smaller sizes, and are usually grown in 5 to 10 cm pots.

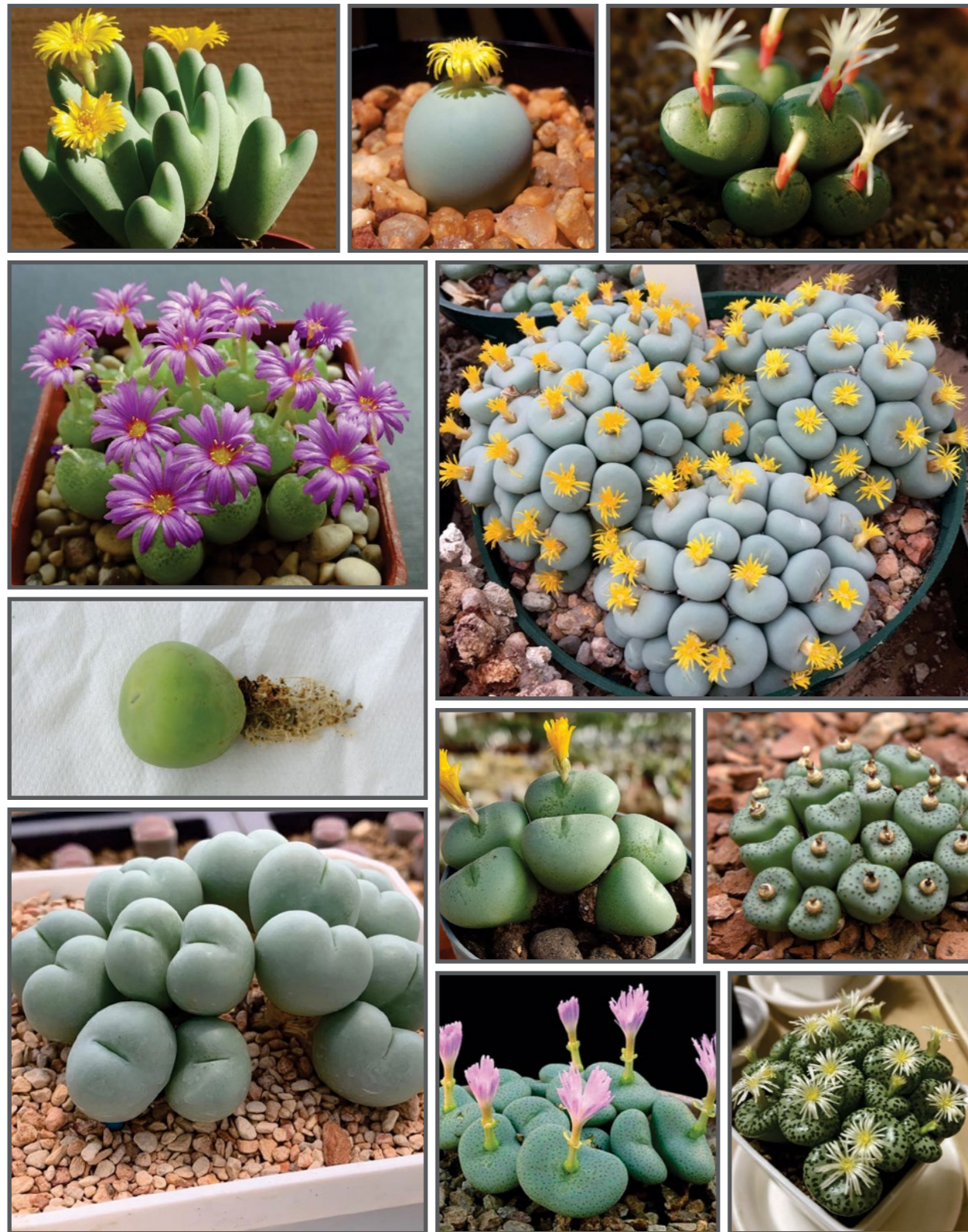
Flowering season

Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.



Artificially propagated plant material

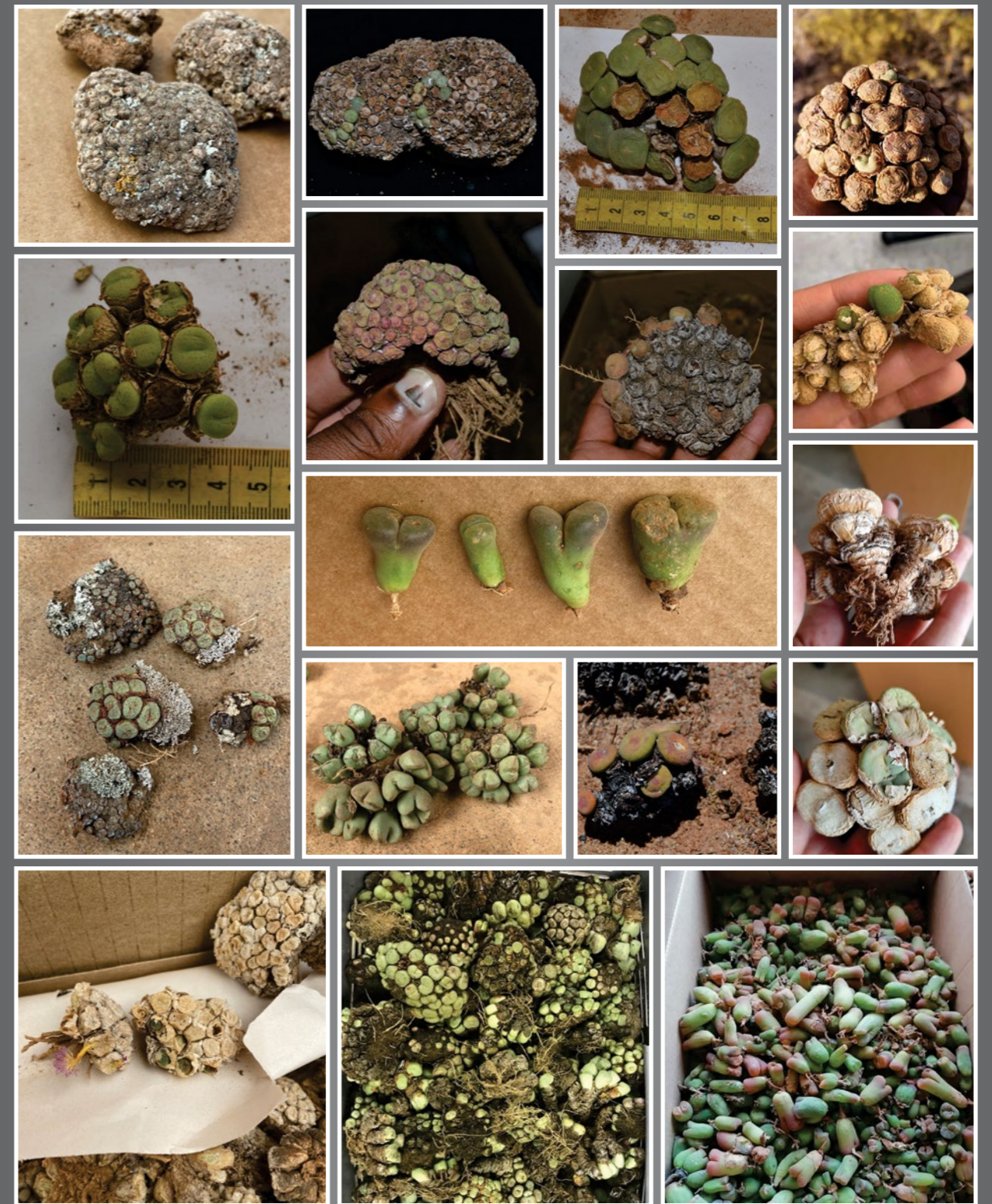
Small plants that are neat, healthy and well-cleaned. With bright colours, 'juicy' leaves, and no damage or habitat materials.



Conophytum species

Wild-collected plant material

Large specimens consisting of multiple individual stems (leafy heads) with parts that may appear damaged, desiccated, dead or in a generally poor condition. Growth compact and habitat soil/organisms (e.g., lichen) still attached. (Photographs: LK, LJ & ZZ).



Conophytum species

Crassothonna clavifolia

Conservation status: Least Concern; non-endemic; indigenous to the Northern Cape.

Protection status: Schedule 3 (Northern Cape Nature Conservation Act No. 9 of 2009).

Common names and synonyms: *Othonna clavifolia*



BduP

Description

A low-growing stem succulent with short branches and leaves clustered at the tips. The grey branches trail, becoming gnarled with age. The succulent leaves are cylindrical to barrel-shaped, narrow at the base with rounded tips and smooth surfaces. They are grey-green to purplish grey, depending on the stress levels imposed by the harsh climatic conditions of the plant's growing environment. Flowering heads grow on long, erect, wiry peduncles that branch sparsely. A member of the daisy family, it has a typical 'daisy' flower head consisting of one whorl of small, yellow ray florets surrounding the tiny, yellow disc florets. The rounded buds show the single whorl of fleshy involucre bracts before the yellow parts appear. The specific epithet, *clavifolia*, is derived from the Latin words *clava* meaning a club and *folia* meaning leaves, referring to the club-shape of the leaves.

Defining characteristics

- Club-shaped, succulent leaves.
- Pale, grey to light brown stem.

Flowering season

Jan. | Feb. | Mar. | Apr. | **May** | June | July | Aug. | Sept. | Oct. | Nov. | Dec.



PvW



NH



BduP



BduP



NH

Artificially propagated plant material

Small plants with more regular growth patterns and smaller, less-thickened stems with wider branching.



Crassothonna clavifolia

Wild-collected plant material

Large sizes and irregular growth patterns, usually with (compact) thickened, 'aged', multiple branching main stem.



Crassothonna clavifolia

Mestoklema tuberosum

Conservation status: Least Concern; endemic to the Eastern Cape.

Protection status: Schedule 4 (Nature and Environmental Conservation Ordinance No. 19 of 1974).

Common names and synonyms: Common donkey fig.



TR



FR

Description

A member of the ice plant family. A perennial, bushy, much-branched shrub, 30–60(–70) cm tall, with characteristic tuberous roots often referred to in cultivation as a caudex. Most members of the ice plant family (Aizoaceae) are either dwarf or else prostrate spreaders, but a few kinds are shrubby, including members of the genus *Mestoklema*. There are six species within the genera, and plants in cultivation are usually encountered as potted specimens with the upper portion of their attractive swollen tuberous roots on display. *Mestoklema tuberosum* has small, finger-like leaves, which are rounded-triangular in cross-section and with a minutely bumpy texture like that of a tongue. The flowering period extends from early spring throughout summer and into autumn when the daisy-like flowers are produced on short branching inflorescences at the tips of the branches. The flower colour varies but is generally in the red–orange–yellow range.

Defining characteristics

- Develops a miniature, tree-like habit with a gnarled, intertwined tuber (sometimes referred to as a caudex) that has smooth, reddish bark.
- This dramatic tuberous root system is the most remarkable feature of the plant.

Flowering season

Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.



FR



GL



TR

Artificially propagated plant material

Small plants with more regular growth patterns and smaller, less-thickened tubers with wider branching.



Mestoklema tuberosum

Wild-collected plant material

Large sized tubers (covered in a dark reddish bark) with irregular growth patterns and branches arising at different points of the main plant body. Damage from harvest often noticeable.



Mestoklema tuberosum

Monsonia herrei

Conservation status: Vulnerable; non-endemic; indigenous to the Northern Cape.

Protection status: Schedule 3 (Northern Cape Nature Conservation Act No. 9 of 2009).

Common names and synonyms: Fine-leaved candle-bush; bush candle; *Sarcocaulon herrei*.



PvW

Description

A dwarf, perennial, woody looking shrub with a fleshy, branched, erect to semi-erect, 5–25 cm tall stem that is up to 35 cm in diameter. Each branch may be up to 1.2 cm thick. The plant resembles a small bonsai tree with delicate, finely divided, fern-like, hairy, dark green deciduous leaves. The leaves have either long or short petioles (0.6–3.0 cm long), which slowly become transformed into notable spines over time. The flowers are solitary with 5 petals and 5 sepals (sepals with silky hairs), generally on a long peduncle and typically white to pale yellow in colour. Flowers may last for many months.

Defining characteristics

- A well-branching shrub armed with fearsome spines and very fine leaves.

Flowering season

Jan. Feb. Mar. Apr. May June July **Aug.** Sept. Oct. Nov. Dec.



JSa



JSa



MM

Artificially propagated plant material

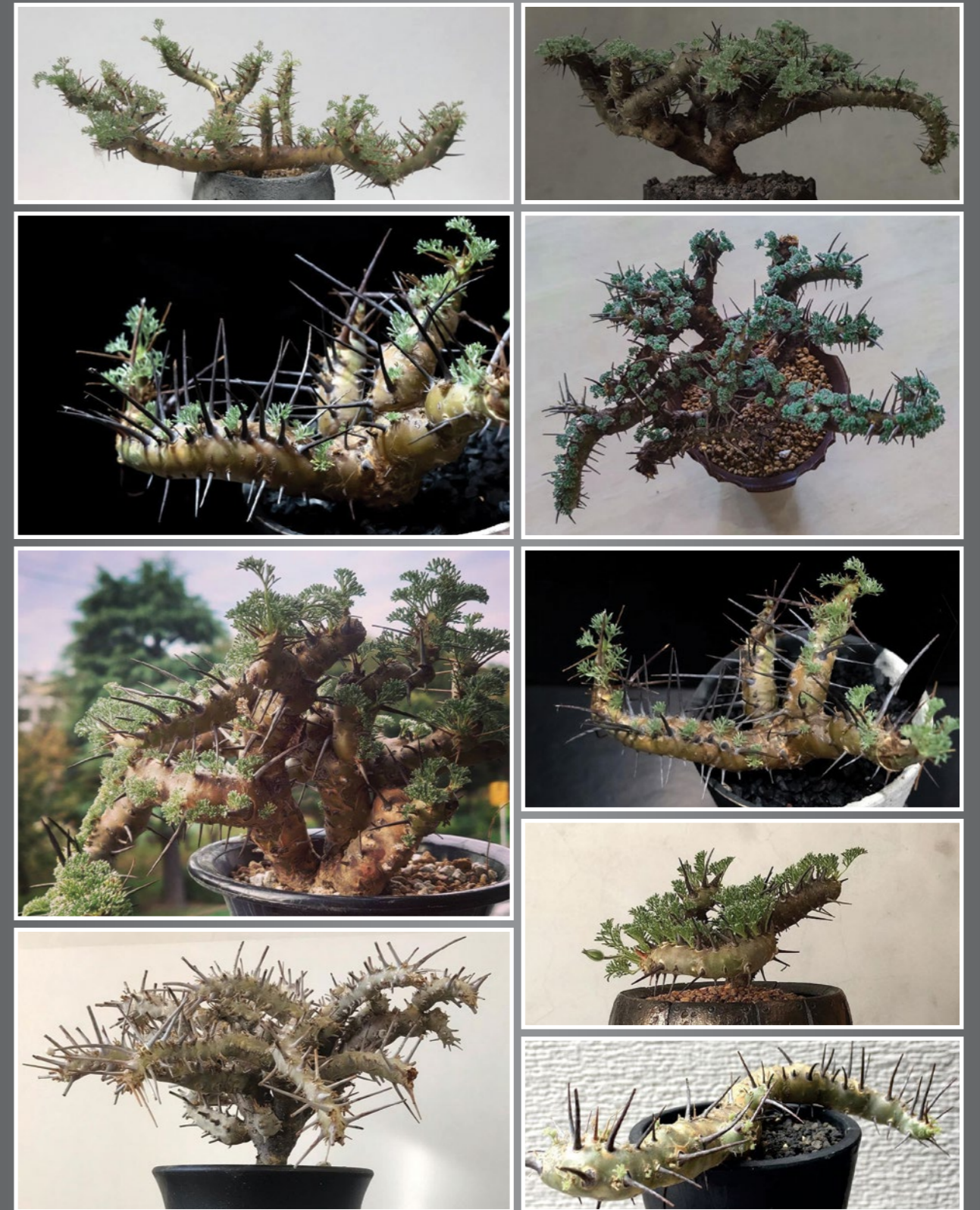
Smaller plants with few branches and neat, typically upright growth. Spines not very well-developed.



Monsonia herrei

Wild-collected plant material

Many-branched, large plants with thick, tentacle-like, often horizontal and spreading growth. Spines well-developed, thickened and hard.



Monsonia herrei

Monsonia multifida

Conservation status: Critically Endangered; non-endemic; indigenous to the Northern Cape.

Protection status: Schedule 3 (Northern Cape Nature Conservation Act No. 9 of 2009).

Common names and synonyms: Red-throat dwarf candle-bush; bush candle; *Sarcocaulon multifidum*.



Description

A semi-erect, dwarf shrublet with long-lived, fleshy and knobby stems, being able to reach to 20 cm high, and up to 25 cm wide. The branches are short, and thick (rarely more than 2 cm across) and they spread horizontally. The growing stems usually lack spines and have a greyish brown to greyish white woody appearance. The leaves are long petioled, usually erect, in two rows along the top of each horizontal branch and are greyish, finely divided into deep segments and hairy. Flowers with short peduncles; white, pale pink or magenta in colour, with red or crimson throat markings; rarely pure white. The flowers consist of five petals and five densely hairy sepals.

Defining characteristics

- A dwarf shrublet with few, dark brown, knobby stems without spines.



Flowering season

Jan. | Feb. | Mar. | Apr. | May | June | July | **Aug.** | Sept. | Oct. | Nov. | Dec.



Artificially propagated plant material

Smaller plants with few branches and neat, typically upright growth.



Monsonia multifida

Wild-collected plant material

Many-branched, large specimens with thick, tentacle-like, often horizontal and spreading growth.



Monsonia multifida

Monsonia patersonii

Conservation status: Least Concern; non-endemic; indigenous to the Northern Cape.

Protection status: Schedule 3 (Northern Cape Nature Conservation Act No. 9 of 2009).

Common names and synonyms: Bushman's candle; *Sarcocaulon patersonii*; *Sarcocaulon rigidum*.

Description

A spiny, prostrate to semi-erect shrublet (up to 50 cm tall) with branches covered in a thick, hard, waxy bark and rows of single, thick spines and tufts of short stalks in the axils of the spines. These spines and stalks are the persistent petioles or leaf stalks respectively. The leaves are small, wedge-shaped and the leaf blade is smooth, bluish grey with an entire margin. The flowers generally consist of five, large, rose-coloured petals and five sepals, but some forms may

have slightly darker, pale magenta to purple flowers. The bark is extremely hard and resilient to the harsh growing conditions in its natural habitat.

Defining characteristics

- A tall, erect, spreading shrublet with wedge-shaped leaves and a thick, waxy bark.
- Fleshy, yellowish stems typically armed with spines.



NH



LK



KW



PvW



DGE



NH

Flowering season

Jan. | Feb. | Mar. | Apr. | **May** | June | July | Aug. | Sept. | Oct. | Nov. | Dec.

Artificially propagated plant material

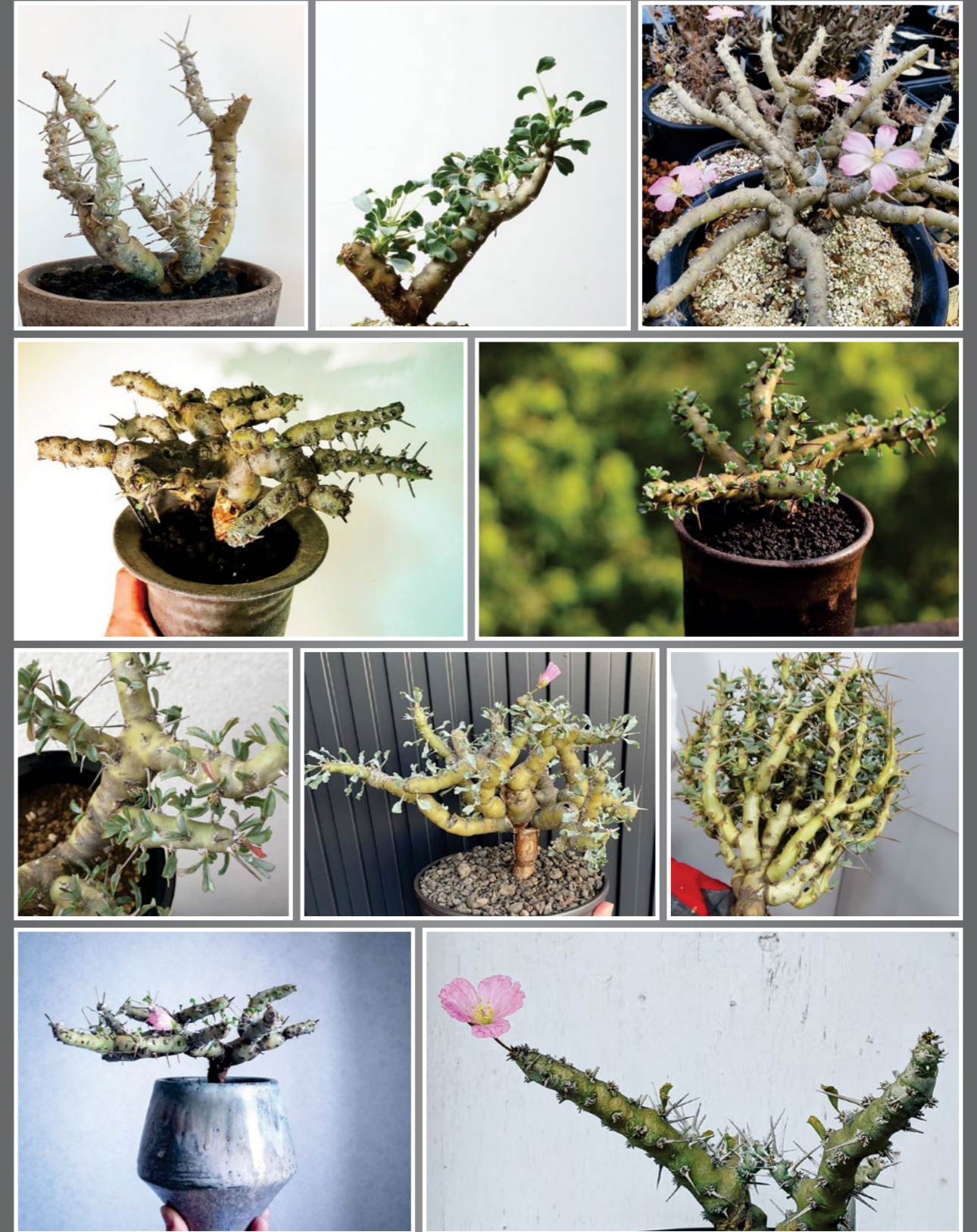
Small plants with few branches and neater, typically upright growth.



Monsonia patersonii

Wild-collected plant material

Many-branched, large specimens with thick, tentacle-like, often spreading, growth.



Monsonia patersonii

Othonna armiana

Conservation status: Critically Endangered; endemic to the Northern Cape.

Protection status: Schedule 1 (Northern Cape Nature Conservation Act No. 9 of 2009).

Common names and synonyms: Kahams baboon cabbage.

Description

A dwarf succulent shrub with fibrous roots, distinguished by its subterranean caudex (which is flattened above), its short dense knobby branches (covered in phyllopodia or swollen tubercles made up of the expanded and fused bases of leaves), and its obovate to orbicular, serrated to entire, succulent leaves. It is the most compact and dwarf-sized of the three *Othonna* species with bumpy-tuberculate stems. The dark brown, longitudinally fissured caudex is flattened above and tapering below (like a turnip), typically measuring up to 70 mm in diameter. The branches are short and compact, 3–20 mm long, 3–10 mm in diameter with persistent, cartilaginous, oblong phyllopodia 2–5 mm long, 2–3 mm in diameter, brownish purple and truncate (shortened) at the apex. Young branches are slightly woolly, becoming glabrous. The leaves are small and succulent, between 5–22 mm long and 5–18 mm wide, with a

2–4 mm short petiole that is slightly woolly at the base. The leaf blade is orbicular to obovate in shape (rounded at the tip and more wedge-shaped at the base), dorsiventrally compressed, glabrous, with entire to serrate margins, and tinged with purple at the tips. The floral structures are yellow (with 7–9 ray florets with tiny bracts at the base), borne as single or 2–5 radiate heads on erect, terminal peduncles, which are 60–90 mm long, 1.0–1.5 mm thick, terete and glabrous.

Defining characteristics

- Dwarf succulent.
- With a flat-topped caudex, and bumpy-tuberculate stems.
- Egg-shaped leaves, which may have entire or serrated margins.

Flowering season

Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.



Artificially propagated plant material

Small plants with compact bases and neat, regular growth.



Othonna armiana

Wild-collected plant material

Many-branched, 'knobby' specimens, often with notable-sized stem bases and misshapen growth/unusual shapes.



Othonna armiana

Othonna cacalioides

Conservation status: Vulnerable; endemic to the Northern Cape and Western Cape.

Protection status: Schedule 3 (Northern Cape Nature Conservation Act No. 9 of 2009).

Common names and synonyms: Potato baboon cabbage; *Othonna minima*; *Othonna pillansii*.



BH



NvB

Description

A tiny, compact, glabrous succulent with a flattened, tuber-like stem or caudex below ground that may branch into as many as 20 or more short, thick stumpy heads (up to 20 mm each in diameter), all scarcely above soil level. The mostly subterranean, potato-like stem is broad, up to 90 mm or more in diameter with a pale brown, leathery and tough, glossy bark with white-woolly scars. The leaves are small (20–25 mm long; 8–10 mm wide) and bright green, tufted, obovate to spatulate, tapering at the base into a narrow petiole, very obtuse, thickish, coriaceous (with a leather-like texture), faintly 3-nerved, entire, or minutely denticulate with thickened and subreflexed margins. typical 'daisy' inflorescence or 'flower head' is yellow in colour and consists of about 12–30 disc florets encircled by 5–8 ray florets, arising on long peduncles (20–80 mm high) two to four times as tall as the leaves, that are typically one-headed. The leaves die away in summer when the small flowers are formed, and the plants bare their fleshy stems.

Defining characteristics

- Small caudiciform plant, less than 20 cm in diameter with several short and stumpy heads.
- Potato-like.
- Tiny spoon-shaped leaves with entire to slightly toothed margins.

Flowering season

Jan. | Feb. | Mar. | Apr. | **May** | June | July | Aug. | Sept. | Oct. | Nov. | Dec.



NH



NH



NH



NH

Artificially propagated plant material

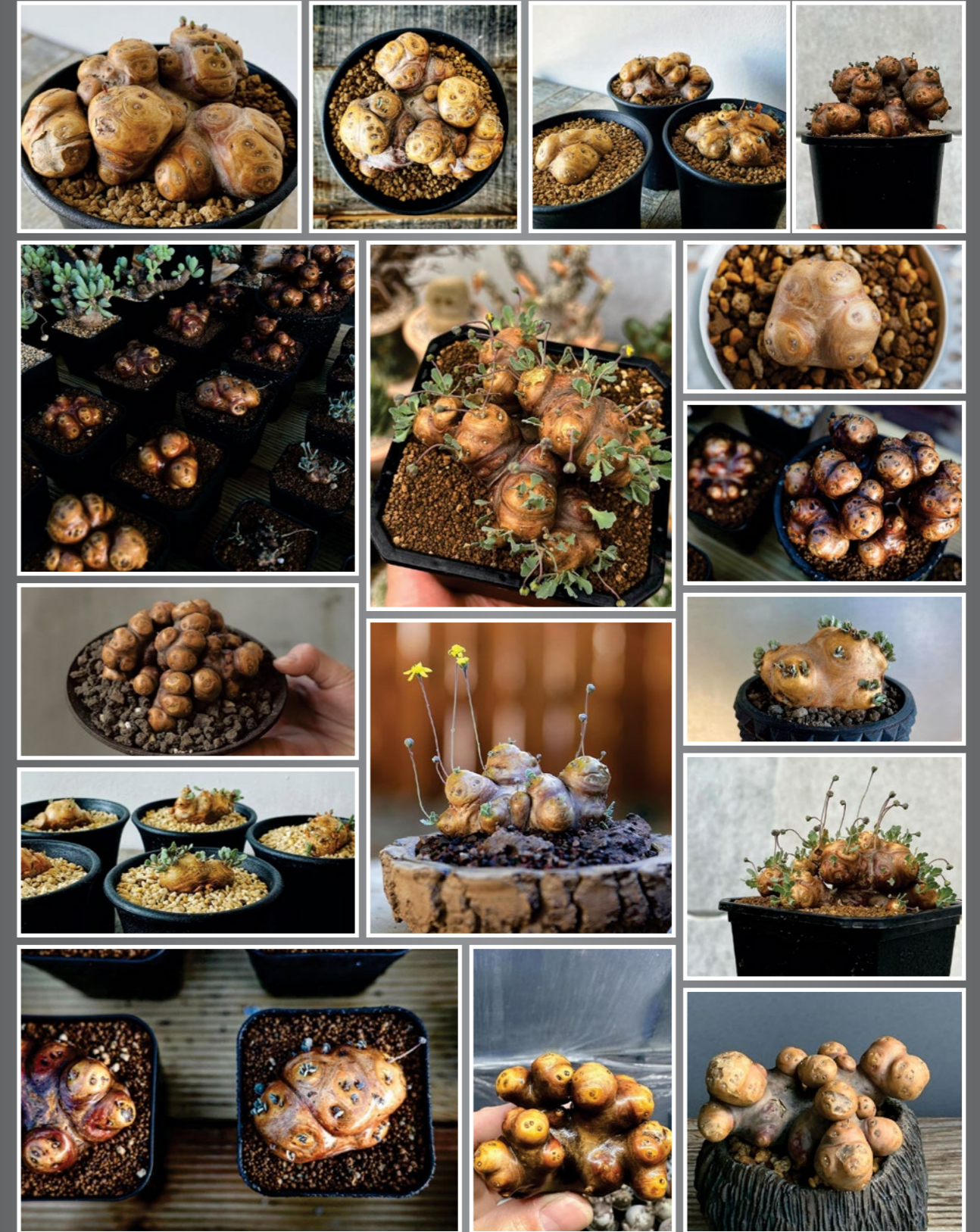
Small plants with more regular-shaped (less stumpy) bases.



Othonna cacalioides

Wild-collected plant material

Many-branched, large specimens with stumpy octagon-like growth.



Othonna cacalioides

Othonna euphorbioides

Conservation status: Least Concern; endemic to the Northern Cape.

Protection status: Schedule 3 (Northern Cape Nature Conservation Act No. 9 of 2009).

Common names and synonyms: Spikey baboon cabbage.

**Description**

A dwarf, spiny, succulent shrub, growing 10–18 cm tall. The short, swollen stem (caudex) is broad, reaching up to 30 cm in diameter, usually covered in a tough, peeling, yellowish grey bark. The plant produces short, sparse branches. In its natural habitat, the species is semi-deciduous, producing leaves and flowers during the winter season. The leaves are small (3–4 cm long), succulent, bluish to light green, elongate-spathulate (paddle/spoon-shaped), narrowed to a petiole-like base and arranged in tufts at ends of branches borne amongst compact arrangements of branched spines. The leaves and branches may be covered in whitish grey powder. The flowering heads are in subumbellate clusters, disc-shaped, consisting of a cluster of small florets grouped in a cup-like capitulum (0.5 cm in diameter), with five green bracts around the outside. They arise on stiff peduncles, which become spinescent once the flower head falls off. The peduncle may be un-forked, but often it forks toward the tip, so that two capitula arise from one peduncle. The tiny florets are greenish yellow in colour.

Defining characteristics

- A spiny, succulent shrub that is more broad than tall.
- With a thickened, peeling caudex, short branches and notable spines – forming spiny masses of compact, succulent stems.

Flowering season

Jan. | Feb. | Mar. | Apr. | **May** | June | July | Aug. | Sept. | Oct. | Nov. | Dec.



Artificially propagated plant material

Small plants with compact bases, few branches and neater/leaner growth. Spines less prominent.



Othonna euphorbioides

Wild-collected plant material

Many-branched large specimens with misshapen growth, peeling bark and swollen stems. Stems sometimes blackened/darkened irregularly as a result of prolonged sun exposure in the wild. Spines more prominent.



Othonna euphorbioides

Othonna retrorsa

Conservation status: Least Concern; endemic to the Northern Cape.

Protection status: Schedule 3 (Northern Cape Nature Conservation Act No. 9 of 2009).

Common names and synonyms: None.

**Description**

A geophytic, cushion-forming, succulent species, with a many-headed, suberect, woolly caudex, 5–8 cm high and nearly 2.5 cm thick. The branches are short and thick, forking from the central caudex, with a woolly growing point and densely clothed in the shaggy, reflexed bases of old dead leaves. The plant produces persistent rosettes of very distinctive, leathery, reticulate-veined leaves. The leaves are crowded around the apices of branches, linear to oblanceolate or oblong-spathulate, narrowed to the base, subacute, thin, rigid (leathery), and prominently net-veined on both sides, 3.0–7.5 cm long, 0.8–1.5 cm wide, chalky grey-green, with cartilaginous margins, bearing few to many pale, patent or retrorse small white marginal teeth. The axils are very woolly. One or more sparsely branched flowering stems with small yellow flower heads are produced from each rosette. The yellow flower heads consist of 5–8 involucral scales, 5–8 ray florets and 15–30 disc florets borne at the end of long, nude pedicels. The peduncles (or scapes) are few-headed, erect, 10–20(–35) cm long, striate, mostly unbranched, or forked and loosely subcorymbose. Plants can grow up to 10 cm tall and 30 cm in width.

Defining characteristics

- Cushion-forming, with a many-headed woolly caudex producing rosettes of very distinctive, leathery, net-veined leaves.
- Dried leaf remains accumulate around the short stems, gradually decaying into a fibrous (ball-like) mass.

Flowering season

Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec.



Artificially propagated plant material

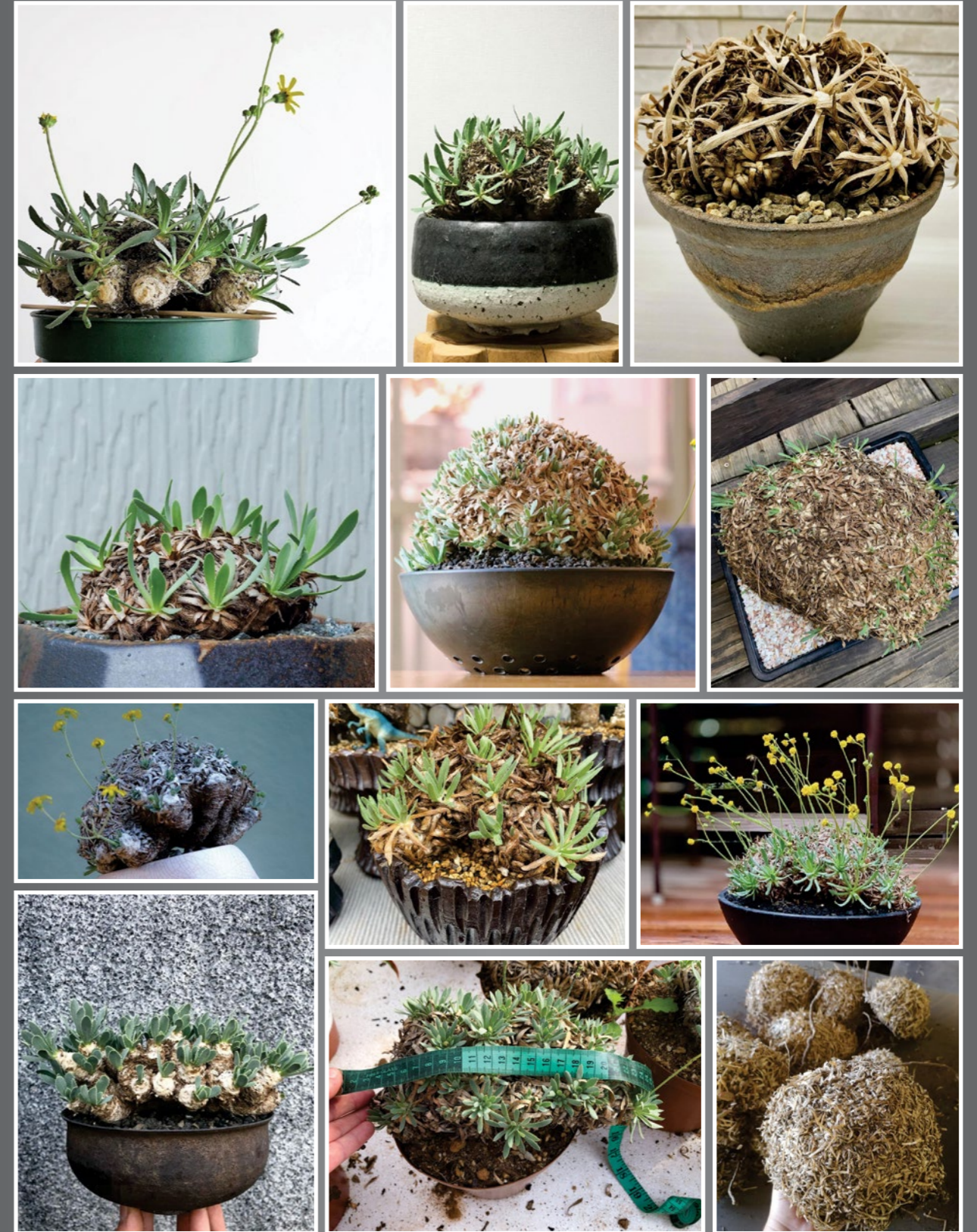
Small plants with compact bases and neat (less shaggy) growth.



Othonna retrorsa

Wild-collected plant material

Many branched, large, ball-like specimens with multiple stems – and often covered in old, dead leaf bases.



Othonna retrorsa

Pelargonium crassicaule

Conservation status: Least Concern; non-endemic; indigenous to the Northern Cape.

Protection status: Schedule 1 (Northern Cape Nature Conservation Act No. 9 of 2009).

Common names and synonyms: *Swartstok*; *Pelargonium mirabile*.



LK

Description

A small, succulent plant with short, smooth, thick, dark brown stems, usually not more than 20 cm high. The leaves are deciduous, forming annually at the end of branches on long petioles. They are simple, broadly ovate-reniform, with conspicuous silver, silky hairs and a wedge-shaped base. They are somewhat lobed, and the margins are bluntly dentate and wavy; veins are prominent on the lower surface that are also densely covered with whitish hairs. The flowers are borne in a cluster of 5–9 per umbel. The corolla is usually white with or without wine-red to purple markings, but can also be pale yellow, pink or lilac, or combinations thereof. The colour may even vary dramatically within the same population. The petals are subequal, calyx densely villous, the tube much longer than the linear, obtuse segments.

Defining characteristics

- Woody species with shiny, dark brown bark, forming bushes rarely more than 30 cm tall, but up to 65 cm in diameter with many succulent to woody, finger-like branches.
- Coral-like branching pattern is unique in the genus.



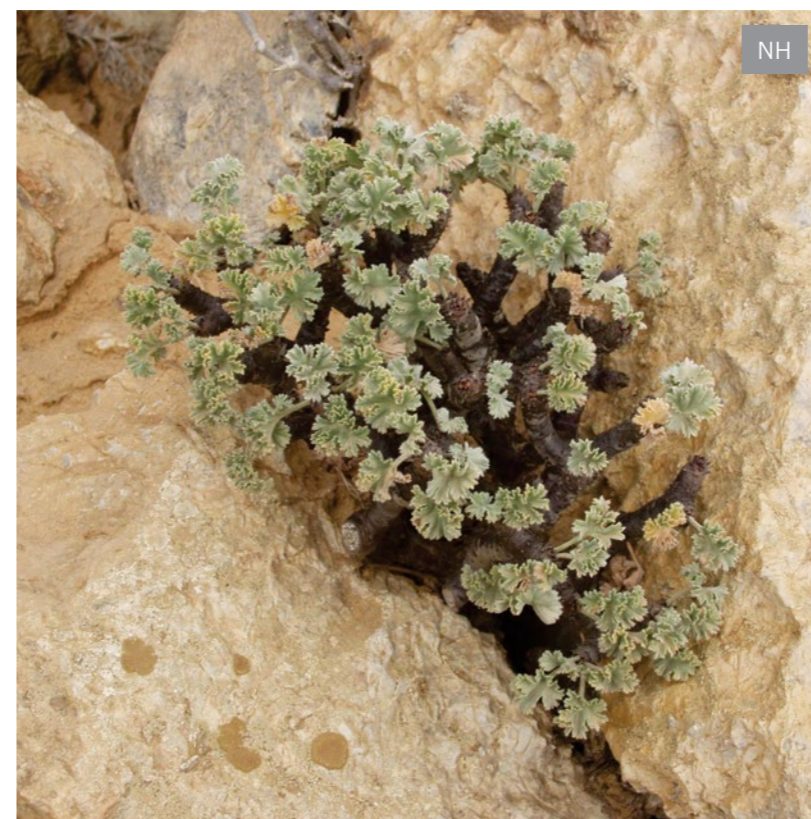
DJ

Flowering season

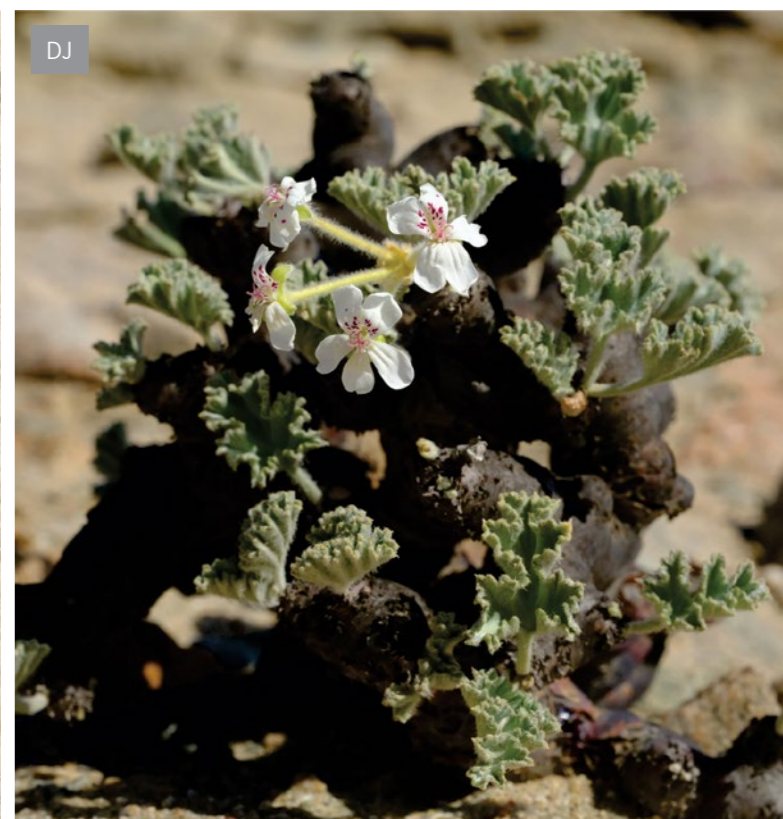
Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec.



NH



NH



DJ

Artificially propagated plant material

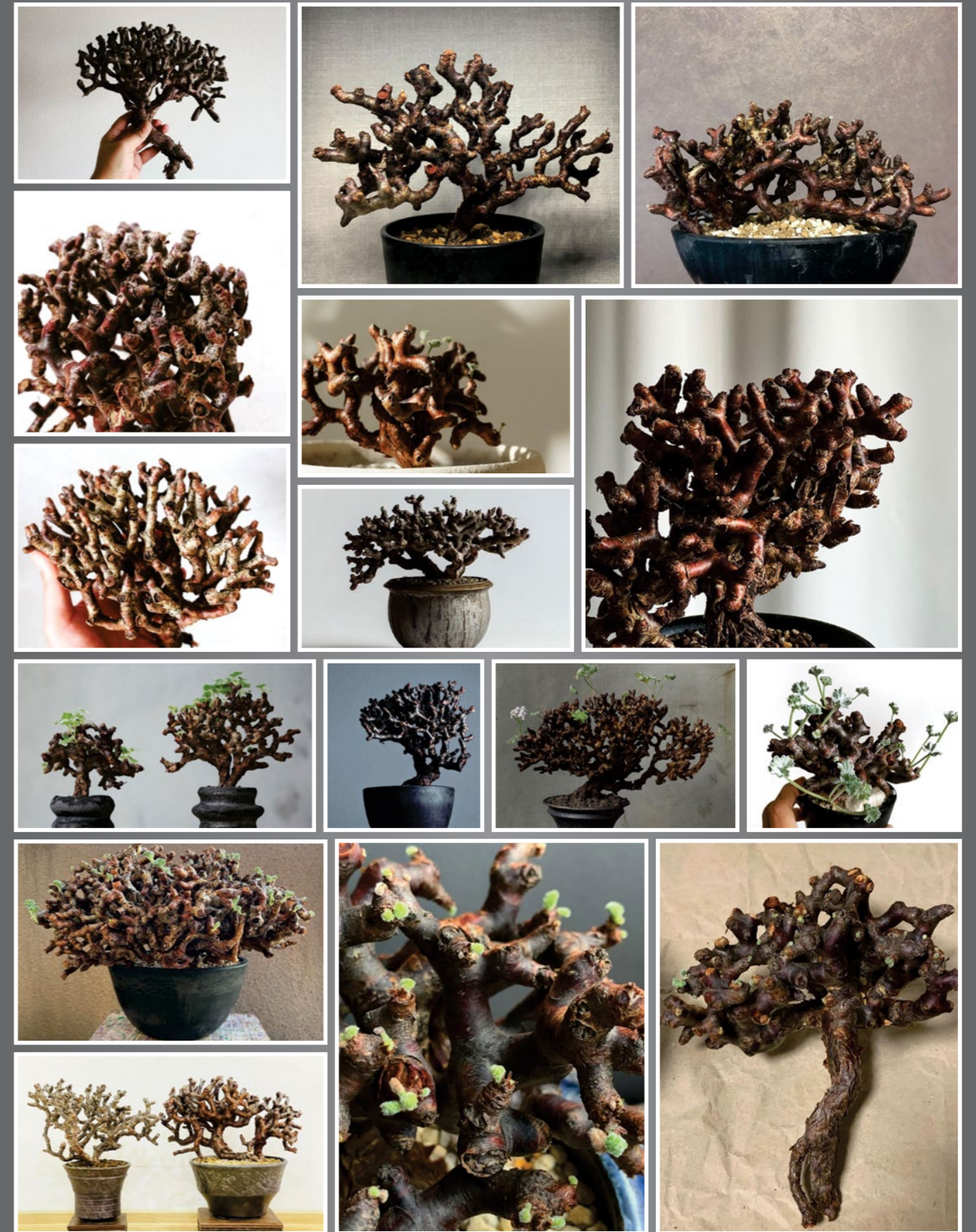
Small plants with narrower stems, less compact growth, and lacking the unique, heavily angled growing pattern of wild specimens.



Pelargonium crassicaule

Wild-collected plant material

Many-branched, large specimens with thick, dark brown to reddish, intertwined, 'coral-like' growing stems.



Pelargonium crassicaule

Pelargonium triste

Conservation status: Least Concern; endemic to the Northern Cape and Western Cape.

Protection status: Schedule 1 (Northern Cape Nature Conservation Act No. 9 of 2009).

Common names and synonyms: Cinnamon geranium; *kaneeltjie*; *rasmus*; *Pelargonium flavum*.



EvB



FB

Description

A succulent geophyte with a large, subterranean tuber that is covered with a characteristic brown, woody, cracked bark. The plant rarely has a visible stem with the erect to prostrate leaves produced directly from ground level in nature. Exposed stems may grow up to 15 cm long and 0.5–1.0 cm thick. The leaves are hairy, oblong-ovate, 10–45 cm long and 4–15 cm in diameter (at least twice as long as they are wide), divided, and softly feathered, resembling the leaves of a carrot plant. Leaf segmentation is variable, 2–4-pinnately compound, incised to varying depth, decurrent, toothed and lacinate, the teeth gland-tipped. The flowers are tiny, subequal obovate, 0.4–0.8 cm long × 1.0–1.8 cm wide, dull brownish yellow, with dark spots, or the petals are dark purple to black with a cream-coloured margin, very sweetly aromatic at night. Posterior petals (at the back) reflexed at approximately 90°, anterior (front-facing) ones less markedly so.

Defining characteristics

- Large, often misshapen, subterranean tuber with a rather cracked, woody bark.
- Leaves resemble the fronds of a carrot plant.



JSc



L



NH



SF

Flowering season

Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec.

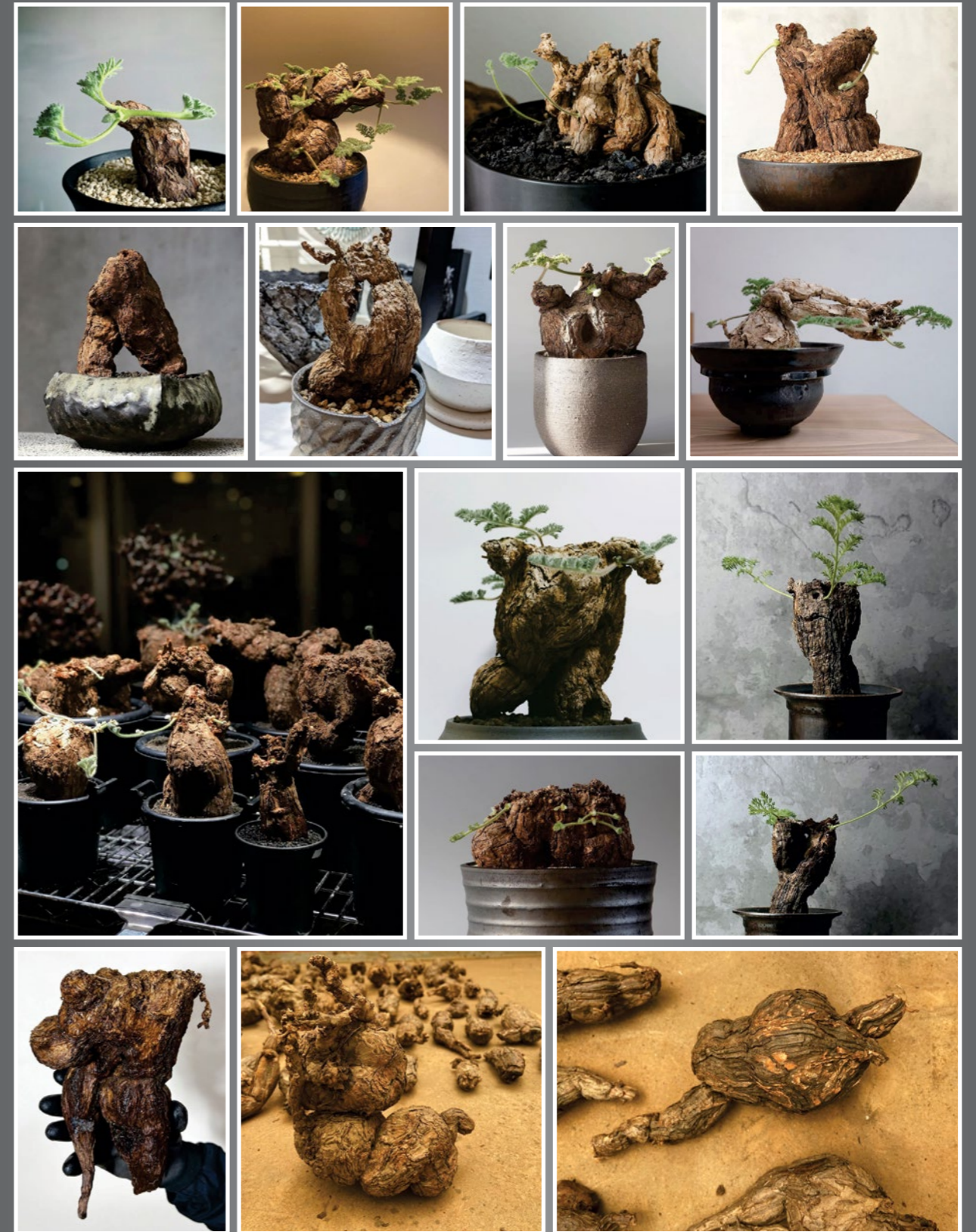
Artificially propagated plant material

Plants with small tubers and more uniform growth patterns.

*Pelargonium triste*

Wild-collected plant material

Large tuberous specimens with characteristic bark, irregular growth, and often without leaves and roots.

*Pelargonium triste*

Portulacaria pygmaea

Conservation status: Endangered; non-endemic; indigenous to the Northern Cape.

Protection status: Schedule 3 (Northern Cape Nature Conservation Act No. 9 of 2009).

Common names and synonyms: Pygmy porkbush; *dwergspekboom*; *Ceraria pygmaea*.



JA



PvW



PvW

Description

Plants consist of a semi-hemispherical, partially underground caudex that produces a few short, rather woody branches covered with slightly peeling bark. In the wild these branches remain short, and the plants gradually form a mound up to around 30 cm across and half as tall. Their succulent, bluish green leaves have an odd, spatulate, almost rectangular shape, and they produce tiny, pinkish white flowers in small clusters from the tips of their irregularly shaped branchlets. Small but striking caudiciforms, mature plants remain rare in cultivation. Their branches will root, but it is not clear if the rooted cuttings ever develop a caudex.

Defining characteristics

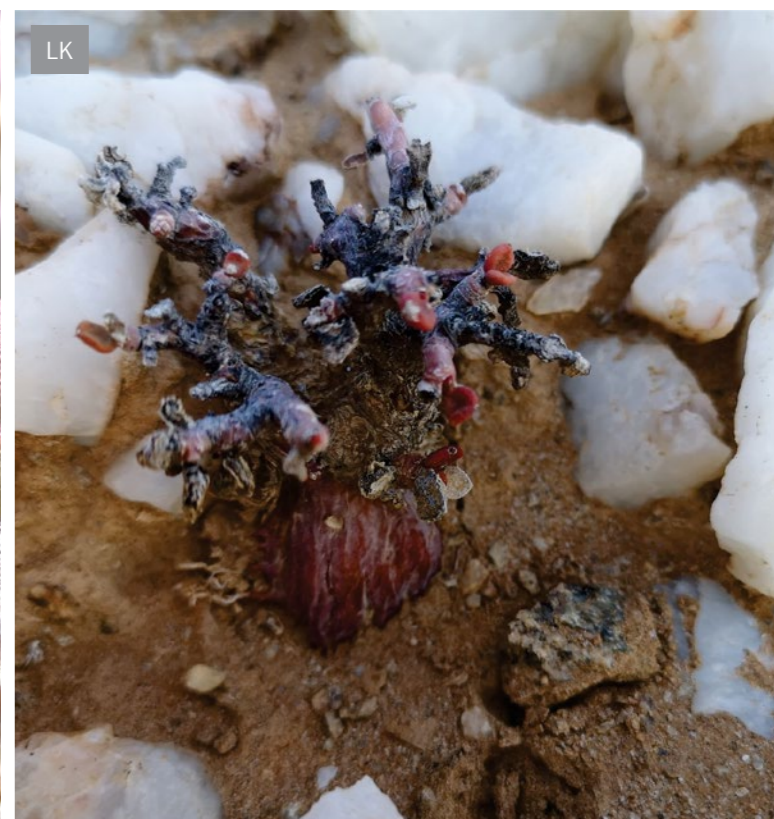
- Dwarf succulent plant with woody caudices covered in a brown peeling bark.
- With short branches and thick, clustered, jelly bean-shaped leaves; blue-green/purple in colour.

Flowering season

Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec.



NH



LK

Artificially propagated plant material

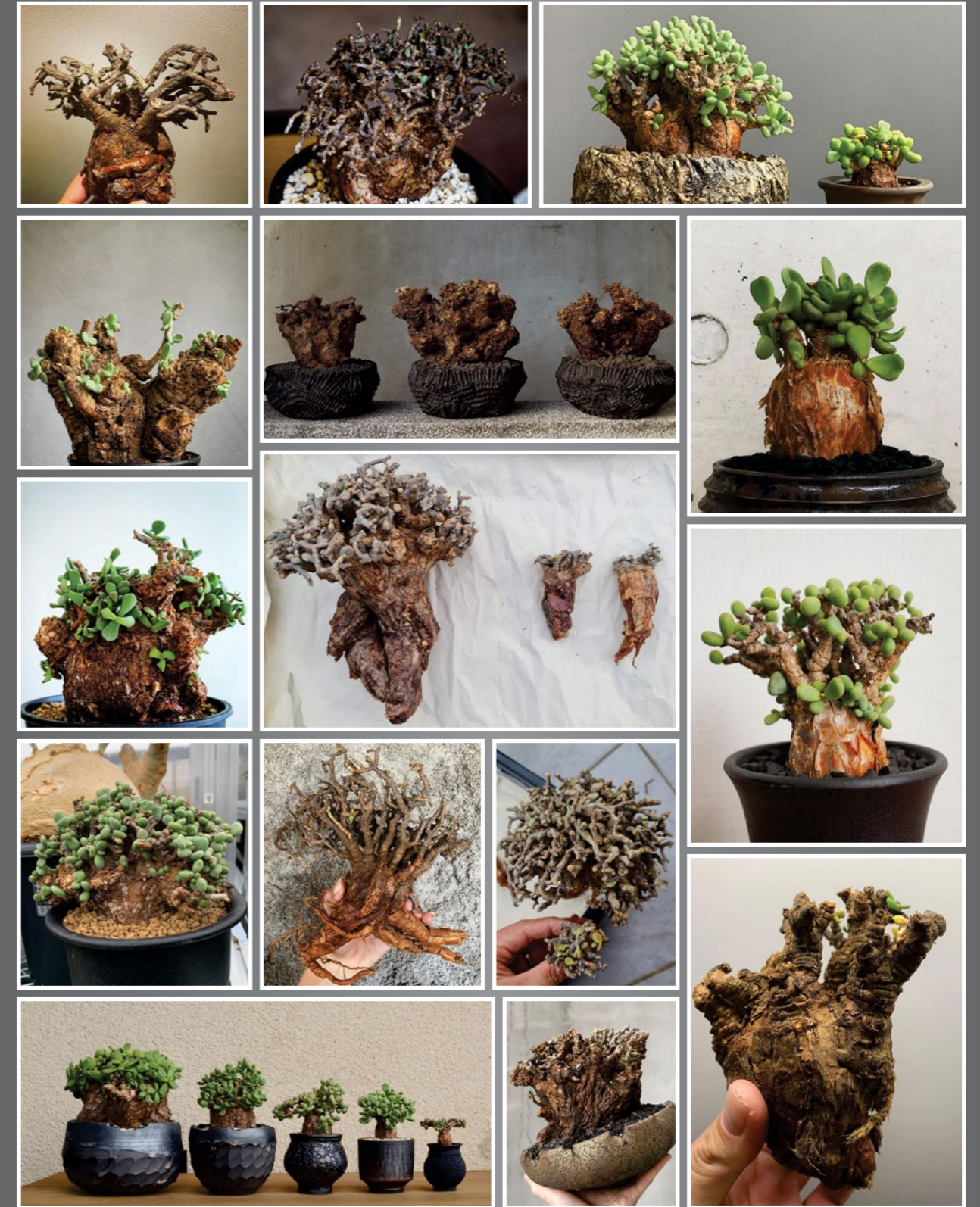
Plants without characteristic swollen base (caudex), elongated branching and less compact growth patterns.



Portulacaria pygmaea

Wild-collected plant material

Large specimens with misshapen growth and notably swollen, 'gnarly' looking caudex base. Branch and leaf growth compact.



Portulacaria pygmaea

Raphionacme zeyheri

Conservation status: Least Concern; endemic to the Eastern Cape.

Protection status: Schedule 4 (Nature and Environmental Conservation Ordinance No. 19 of 1974).

Common names and synonyms: None.

Description

A perennial geophyte, with a swollen, tuberous (caudiciform) base. The tuber measures 60–150(–250) mm high and at least as wide in some cases. The branches arising from the woody neck of the tuber are also up to 150 mm tall. The leaves are simple with entire margins, green to greyish green, and are arranged alternately along the stems, 20–40 mm long, 5 mm broad, linear or linear-lanceolate, subacute, tapering at the base into a very short petiole. The inflorescences consist of small axillary cymes, 5–10-flowered, and 1–2 mm bracts arranged on 1–2 mm long peduncles. Individual flowers are bell-shaped and pale green, very minutely puberulous on all parts to the outside of the corolla. The pedicels are 1–2 mm long and sepals 2 mm long, 1 mm broad, ovate or oblong-ovate, obtuse or subacute and hairy. The lobes of the corolla are green, from nearly

glabrous to puberulous outside, 1–2 mm long, 2 mm broad, oblong, subobtuse. Tube 2.0–2.5 mm long, and bell-shaped. Corona lobes arising at the mouth of the tube, tri-segmented, shortly transverse rectangular at the base; with purple, filiform, central segment 3–4 mm long and two green lateral segments 1 mm long, subulate or reduced to minute obtuse teeth and knee-like greenish coronal feet.

Defining characteristics

- Unique, swollen (largely subterranean) caudiciform base, growing up to at least 100 mm in diameter, with few lateral branches arising from the neck of the tuber.
- Tuber/caudex is often spindle-shaped but may also be quite flat in nature.



DS



AC

Flowering season

Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec.



GC



DS



DS

Artificially propagated plant material

Smaller plants with uniform growth and lacking unusual-shaped tubers – particularly the flattened disc shapes of some wild specimens.



Raphionacme zeyheri

Wild-collected plant material

Large, unusually shaped tubers with unique dentations and markings.



Raphionacme zeyheri

Tylecodon bodleyae

Conservation status: Critically Endangered; endemic to the Northern Cape.

Protection status: Schedule 2 (Northern Cape Nature Conservation Act No. 9 of 2009).

Common names and synonyms: Dimple butterbush.

Description

A dwarf, upright, sparingly branched succulent, growing up to 100 mm tall from a notably swollen caudex (\pm 60 mm in diameter). The few finger-like shoots (stems) are ascending, grey-green, with dark longitudinal striations (i.e., covered in leaf-scars) and articulated at the nodes. The younger branches are typically only 4–5 mm in diameter. The leaves are fleshy, obovate to elliptic, 8–15 mm long, 6–14 mm wide, green to pale green, sparingly glandular-hairy or glabrous

with a cuneate (wedge-shaped) base and acute apex. They are deciduous, arranged in a spiral manner at branch tips, produced annually during the winter season (but may persist longer in cultivation). Falling leaves reveal short, truncate phyllopodia (protuberances left by fallen leaves) on the short stems. The flowers are pretty, whitish, and 'fluffy' (with hairs on the petals). The corolla measures about 11–15 mm long and its tube is funnel-shaped, yellowish green, 3 mm in diameter at the base expanding to 4 mm at the throat, glandular-hairy. The corolla lobes are oblong (5 mm long \times 2.5 mm wide), spreading, becoming recoiled, with long white hairs on the inner surface. The pedicels are 6–16 mm long, glandular-pubescent; the bracts linear, acute, 1.0–1.5 mm long; and sepals triangular-lanceolate, 3 mm long and 1 mm wide. One or two erect flowers arise in inflorescences, up to 40 mm long (with 1 or 2 monochasia), after the leaves have dried and fallen during the dry summer months.

Defining characteristics

- Dwarf succulent (up to 100 mm tall) with a small swollen caudex, several short branches, and few button-like succulent leaves.

**Flowering season**

Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.



HS



PvW



JA

Artificially propagated plant material

Plants with less compact, much branched, more elongated, regulated growth.



Tylecodon bodleyae

Wild-collected plant material

Small plants with a notably swollen caudex and a few thick, irregular shaped stems, and compact growth pattern.



Tylecodon bodleyae

Tylecodon nolteei

Conservation status: Endangered; endemic to the Western Cape.

Protection status: None.

Common names and synonyms: Losthope butterbush.

**Description**

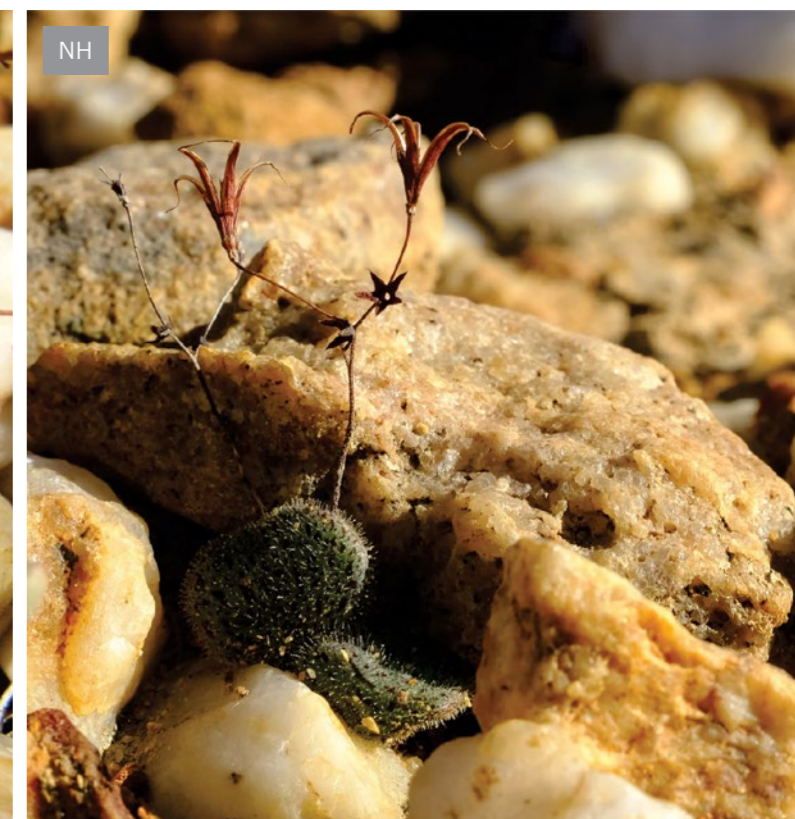
A slow-growing, miniature, felted, cliff-dwelling succulent shrub with a mainly subterranean caudex, and a fibrous root system. In habitat it rarely exceeds 70 mm in height, but it is often taller in cultivation. The thickened main stem is also up to 20 mm in diameter, rarely branching, olive-green to brownish in colour with smooth, slightly peeling bark. The plant produces 2–5, sessile, hairy, orbicular to broadly elliptic, 10–25 mm long and 7–22 mm wide, leaves that are glaucous, green-grey with dark green to reddish translucent spots on the leaf blade. The flowers are creamy to pale pink, up to 15 mm long consisting of 2–3 mm long, hairy, triangular sepals, and an erect, cream-coloured to light pink corolla tube that is pubescent, 12–13 mm long and 4 mm in diameter. The corolla lobes are spreading, 1.5 mm long with obtusely ovate nectaries. Peduncles are 3–15 mm long. Flowers are borne on upright inflorescences that are up to 40 mm tall (with two to several monochasia) and flower remains are persistent for several seasons on the plant.

Defining characteristics

- Tiny dwarf succulent (up to 70 mm tall), with a single main thickened stem up to 20 mm in diameter.
- The plants have beautiful, tiny leaves that are fantastically patterned, hairy, sessile (without stalks), oval/disc-shaped to broadly elliptic.

Flowering season

Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec.



Artificially propagated plant material

Very small specimens with uniform growth patterns and less swollen stems. Often having tiny leaves.



Tylecodon nolteei

Wild-collected plant material

Larger plants (although still rarely exceeding 70 mm in height) with swollen, irregular shaped branching stems and compacted growth. May be traded without leaves and roots.



Tylecodon nolteei

Tylecodon reticulatus

Conservation status: Least Concern; non-endemic; indigenous to the Eastern Cape, Northern Cape and Western Cape.

Protection status: Schedule 2 (Northern Cape Nature Conservation Act No. 9 of 2009).

Common names and synonyms: Thorny butterbush; oukou butterbush; *sifkop*.

Description

A sturdy, compact, perennial species with more or less branched fleshy brown stems scarcely swollen towards the base, covered with yellowish brown peeling bark or sometimes with short circular phyllopodia (protuberances left by fallen leaves) on young branches. The branches are short, thick, gnarled and fleshy or somewhat woody at the base, with greyish, papery, peeling bark. The plant forms a roughly hemispherical dome, 300(–600) mm across, with succulent leaves crowded at the branch tips, and possesses a characteristic crisscross framework of dense ‘spines’ derived from the old heads and stalks of the flowers that grow annually from branch tips. The fleshy leaves are soft and flexible, grey-green/yellowish green, downy or smooth (glandular-pubescent to glabrous), linear, cylindrical, to spindle-shaped (rarely obovate), often flattened or furrowed above, tapering toward the apex with margins curved upwards, 20–45 mm long and 5–7 mm across. The flowers are

erect, 7–15 mm, yellowish green (sometimes tinged brown or purplish along ridges where petals fuse) on 8–25 mm long pedicels. They comprise a cylindrical or urn-shaped corolla tube that is glandular-pubescent outside, 6–8 mm long, with fine hairs on the inside; and the calyx which is 3–4 mm long, glandular pubescent, usually yellowish green. Inflorescences comprise a thyrse with three to many monochasia, each with 2–6(–10) flowers on (15–)50–100 mm long peduncles.

Defining characteristics

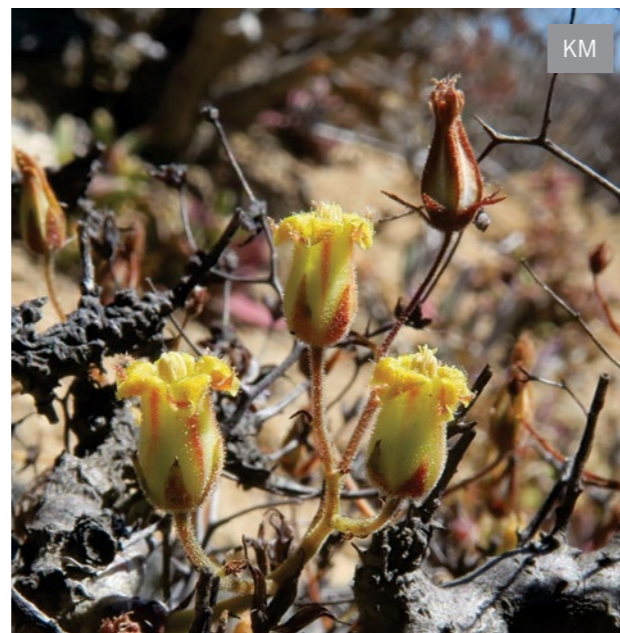
- These plants have a thorny, reticulated protective layer of spines signifying the origin of the species name.
- The stems are thick and impressive with a tuft of succulent, mostly cylindrical bright green leaves.

Flowering season

Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. **Nov.** Dec.



MJ



KM



BS



DT



NH



TV



LK



TV

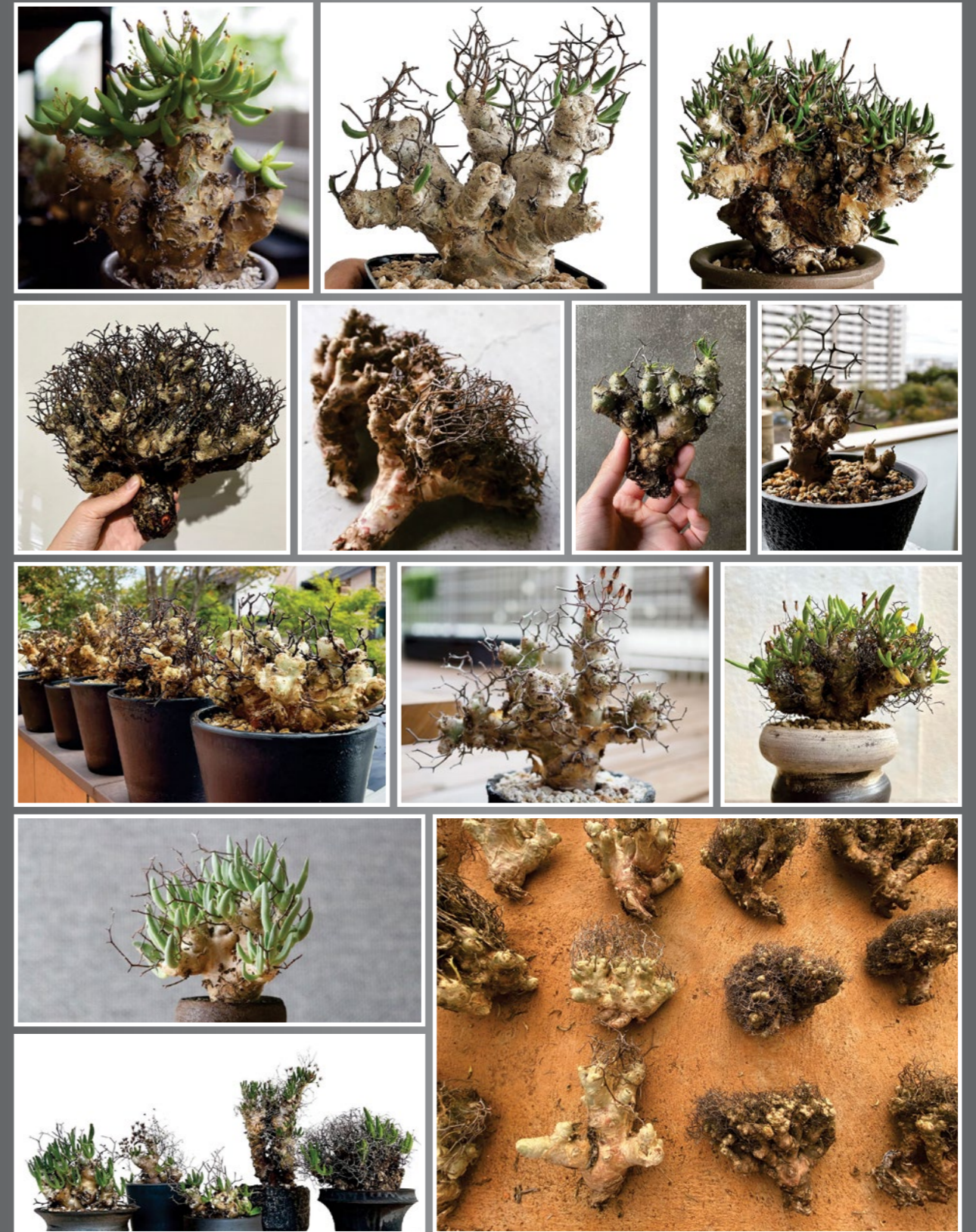
Artificially propagated plant material

Plants with less thickened stems and neater growth without the typical mass of spiny, reticulated branches that affords protection to the plant in the wild.

*Tylecodon reticulatus*

Wild-collected plant material

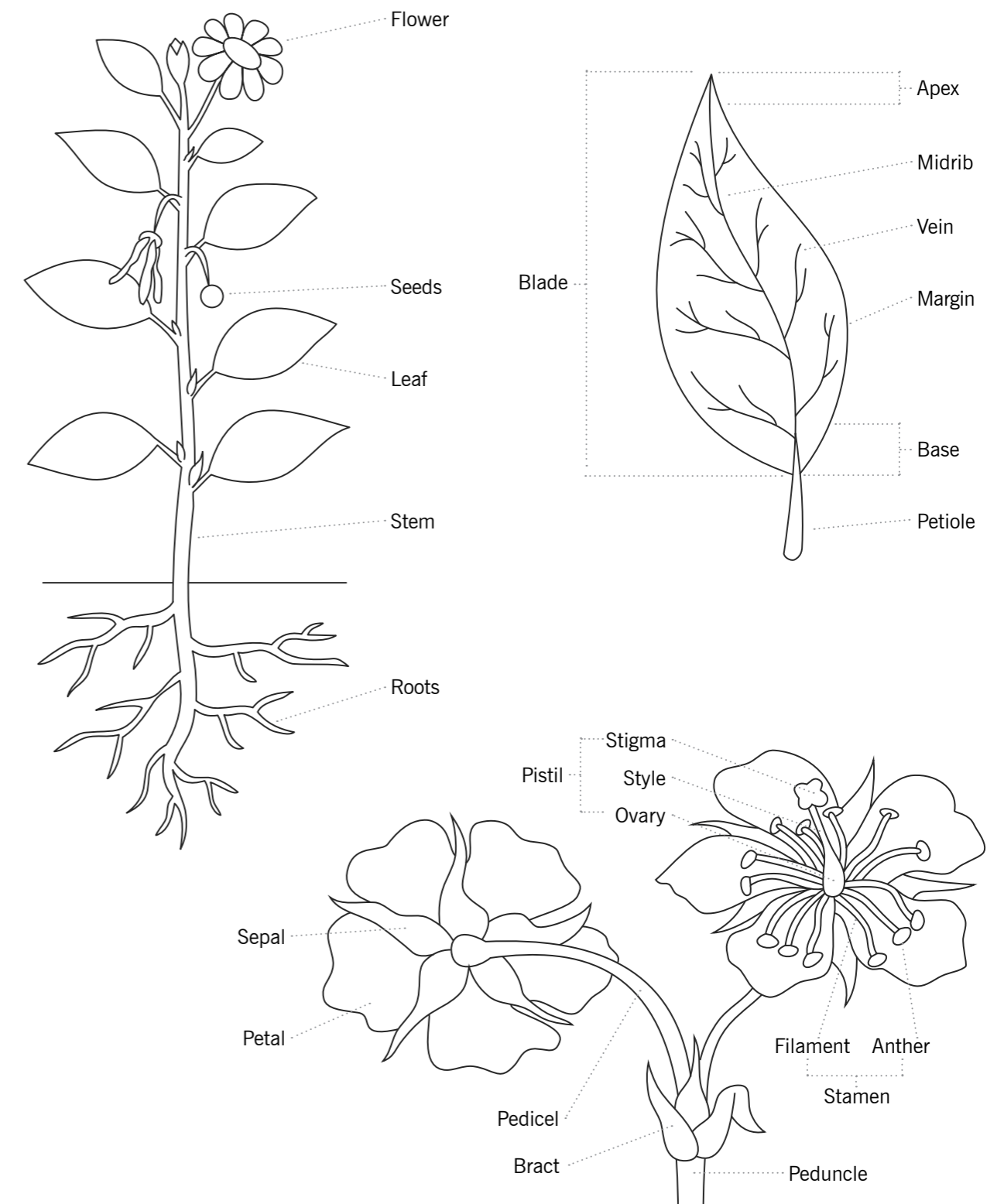
Many-branched, large specimens with misshapen growth and fierce, reticulated spines.

*Tylecodon reticulatus*



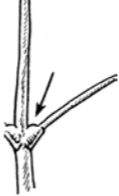

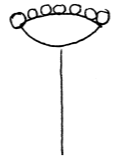
References and further reading

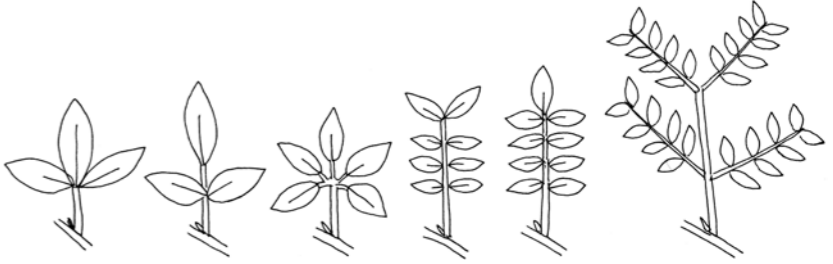

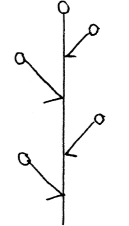
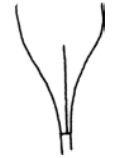

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Basic structure of plants and plant parts



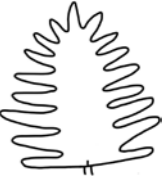







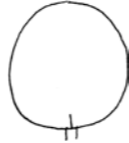

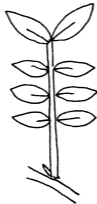
Glossary of terms

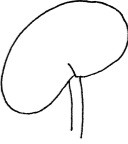

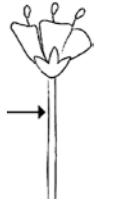



Acute	Sharp; referring to the base (or the tip) of a leaf blade in which the two sides are straight and, when they meet, form an angle that is always less than 90°.	
Alternate	Referring to leaf arrangement – having one leaf per plant node, and they alternate sides.	
Anterior	In front of and facing away from the axis or stem.	
Apex	The growing terminal portions of the stem and roots, where apical (lengthening) growth takes place.	
Artificial propagation	Referring to the artificial/manipulated method of obtaining several plants from one plant typically under carefully controlled conditions. Artificial propagation is carried out by humans (typically outside of nature in a non-natural environment) and can be accomplished via seeds, cuttings, divisions, plant tissues, spores or other propagules of replication. Plants grown under controlled conditions show characteristics that differ from the same species that grow in their natural habitat.	
Axil	The upper angle between a leaf stalk or branch and the stem or trunk from which it is growing.	
Biodiversity hotspot	Geographic regions characterised by exceptional levels of plant species diversity and endemism, and often serious levels of threat.	
Bract	Modified, usually small, leaf-like structure often positioned beneath a flower or inflorescence. Collectively referred to as an involucre.	
Bulbous	Fat, round, or bulging (typically referring to an underground storage organ).	
Calyx	The sepals of the flower, located below the flower petals, collectively called the calyx.	
Capitulum (plural: capitula)	A type of inflorescence, also called a flower head, composed of numerous tiny florets, situated on a compound base (like a daisy flower head).	
Capsule	A type of simple, dry (though fleshy in rare cases) dehiscent fruit (i.e., fruit that splits open at maturity) produced by many species of flowering plants.	



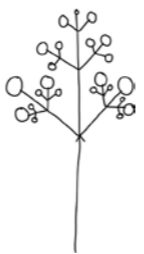

Caudex (plural: caudices)	Referring to the swollen, perennial organ (composed of stem or root or both, and occurring above or below ground) of some succulent plants from which the ephemeral (short-lived), photosynthetic parts of the plant arise.	
Caudiciform	Any plant that forms a caudex, or a fat, succulent base/trunk/root.	
Compound	Referring to a leaf in which the blade is divided to the midrib, forming two or more distinct blades or leaflets on a common axis.	
Coriaceous	Resembling or having the texture of leather.	
Corolla	The petals of a flower, considered as a unit.	
Critically Endangered	A species that has been categorised as facing an extremely high risk of extinction in the wild (in line with the criteria developed by the International Union for Conservation of Nature [IUCN]).	
Cuneate	Referring to a leaf shape – wedge-shaped.	
Cymes	A flat-topped inflorescence in which the central flowers open first, followed by the peripheral flowers.	
Deciduous	Referring to trees and shrubs that seasonally shed leaves.	
Decurrent	Referring to leaf blades that partly wrap or have wings around the stem or petiole and extend down along the stem.	
Dentate	Leaf margins that are toothed, with teeth pointing outward, not forward (as in serrated leaves).	
Denticulate	Referring to a leaf margin bearing many small (fine) toothlike structures.	
Dieback	A condition in which a plant begins to progressively die from the tip of its leaves or roots backwards, owing to disease or an unfavourable environment.	

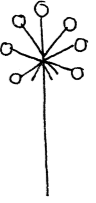
Dorsiventral	Having distinct dorsal (top) and ventral (bottom) sides, as with most foliage leaves.	
Elliptic	(Of a leaf/petal shape) in the form of an ellipse.	
Endangered	A species that has been categorised as facing a high risk of extinction in the wild (in line with the criteria developed by the International Union for Conservation of Nature [IUCN]).	
Endemic	Referring to a species that grows naturally in a specific area and has a restricted distribution, i.e., occurs in a single, defined geographic location.	
Epidermis	A single (outermost) layer of cells that covers the leaves, flowers, roots and stems of plants. It forms a boundary between the plant and the external environment.	
Felted	Matted with intertwined hairs; forming felt or felt-like structures.	
Fibrous	Referring to the roots, usually formed by numerous, thin, equal-sized, moderately branching roots growing from the stem; the opposite of a taproot system.	
Filiform	Shaped like a filament – thread-like.	
Fissured	Having long, narrow cracks or openings.	
Florets	One of the small flowers making up a composite flower head.	
Furrowed	Having a longitudinal groove or channel.	
Genus	Biological classification comprising of species that have been linked together based on phylogenetic relatedness or common features, such as sharing similarities or specific structural characteristics.	
Geophyte	Plants that usually have underground storage organs, where energy and water is kept ensuring survival during unfavourable conditions but also to allow for reproduction when resources may be limited. A broad synonym for a geophyte is 'bulb', but they are far more diverse than that: geophytes also include plants with tubers, corms and rhizomes.	
Glabrous	Free from hair, smooth.	
Glandular	Having stiff hairs with enlarged gland at tip.	
Glaucous	Covered with a greyish, bluish or whitish waxy coating or bloom that is easily rubbed off.	
Gnarled	Knobbly, rough and twisted, especially with age.	
Indigenous	A species that naturally occurs in a large geographical area.	

Inflorescence	A cluster of flowers on a branch or a system of branches arising from one single flowering stem or main axis called the peduncle.	
Involucre	A rosette of bracts surrounding an inflorescence or at the base of an umbel.	
Laciniate	Leaves which are divided into deep narrow irregular segments.	
Lanceolate	Shaped like a lance head; of a narrow oval shape tapering to a point at each end.	
Leaf blade	The broad portion of a leaf that is distinct from the petiole.	
Leaf margin	The boundary area extending along the edge of the leaf, the shape of which forms an important aspect used in plant identification.	
Least Concern	A species that is evaluated against the criteria developed by the International Union for Conservation of Nature (IUCN) and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.	
Lobed	Leaves with distinct indents, either rounded or pointed.	
Monochasia	A cyme in which each flowering branch gives rise to one lateral branch, so that the inflorescence is helicoid or asymmetrical.	
Nectaries	Specialised nectar-producing structures of the flower.	
Node	A point of attachment of a leaf or a twig on the stem in seed plants. Not to be confused with an internode (the portion of a plant stem between two nodes).	
Oblong	Referring to a leaf shape – rounded at each end with parallel sides.	

Obovate	Referring to a leaf shape – oval with the narrower end at the base.	
Obtuse	Blunt, referring to the base (or the tip) of a leaf blade in which the two sides are straight and, when they meet, form an angle greater than 90°.	
Orbicular	Having a spherical or rounded shape like the shape of a flat ring or disc.	
Ovate/ovoid	Having an oval outline; egg-shaped.	
Pedicel	The stalk of each flower in an inflorescence.	
Peduncle	The stem holding an entire inflorescence.	
Perennial	A plant that lives for more than two years.	
Petal	Petals are modified leaves that surround the reproductive parts of flowers. They are often brightly coloured or unusually shaped to attract pollinators. All the petals of a flower are collectively known as the corolla.	
Petiole	The stalk that attaches a leaf to the plant stem.	
Phyllopodium (plural: phyllopodia)	The main stem or axis of a leaf, made up of the expanded and fused bases of several leaves. A typical foliage leaf has three parts: (a) hypopodium or the leaf base, (b) mesopodium or the petiole, i.e., the stalk of the leaf, and (c) epipodium or the leaf lamina or blade. The entire leaf axis is known as the phyllopodium.	
Pinnate	(Of a compound leaf) having leaflets arranged on either side of the stem, typically in pairs opposite each other.	
Pollen	A mass of microspores (male gametophytes) in a seed plant, usually appearing as a fine dust.	
Propagule	A vegetative structure that can become detached from a plant and give rise to a new plant, e.g., a bud, sucker or spore.	
Prostrate	Growing along the ground.	
Puberulous	Covered with very fine down; finely pubescent.	
Pubescent	Having a hairy surface; covered by a layer of short, soft hairs.	
Radiate	To diverge or spread from, or as if from, a central point.	
Recoiled	Drawn back.	

Reflexed	Bent or turned downward.	
Reniform	Kidney-shaped.	
Reticulate	Arranged or marked like a net or network.	
Retorse	Turned or bent backward or downward.	
Rosette	A circular arrangement of leaves or of structures resembling leaves. In flowering plants, rosettes are usually at or close to the ground.	
Scape	A peduncle arising from a subterranean or very compressed stem, with the lower internodes very long and hence few or no bracts. Typically, it takes the form of a long, leafless flowering stem rising directly from a bulb, rhizome, or similar underground organ.	
Segments	A part or subdivision of an organ, e.g., a petal is a segment of the corolla.	
Sepal	Part of the flower that typically functions as protection for the flower in bud, and often as support for the petals when in bloom. A group of sepals collectively form the calyx.	
Serrated	Having a jagged edge; sharply toothed with teeth pointing forwards towards the apex.	
Sessile	Attached directly to a plant by its base without a stalk or peduncle.	
Shrub	A small- to medium-sized perennial woody plant.	
Spathulate	Referring to the leaf, a rounded blade tapering gradually to the base; spatula- or spoon-shaped.	
Species	Biological classification of a group comprising related organisms that share common characteristics and are capable of interbreeding. In botany, subspecies is a taxonomic rank below species, used for populations that live in different areas and vary in size, shape, or other physical characteristics (morphology), but that can successfully interbreed.	
Spinescent	Becoming spiny; tapering to a sharp rigid point.	

Stamen	The floral organ that bears pollen; consisting of a thin filament that supports the anthers.	
Striate/striation	A fine line, ridge, groove, or streaks of colour; an organ with striations is said to be striate.	
Subacute	Moderately acute in shape or angle.	
Sub-corymbose	Somewhat flat-topped.	
Sub-obtuse	Partially obtuse – with a rounded end.	
Sub-reflexed	Slightly bent or turned downward.	
Subterranean	Occurring under the surface of the earth.	
Subulate	Slender and tapering to a point; awl-shaped.	
Sub-umbellate	A partial or seeming umbel, but not quite.	
Tapering	To become smaller or thinner toward one end.	
Tendrils	Specialised stems, leaves or petioles with a threadlike shape used by climbing plants for support and attachment.	
Terete	Cylindrical or slightly tapering and without substantial furrows or ridges; needle-like.	
Thyrse	Type of inflorescence; a compact, branching flower cluster.	
Translucent	Permitting light to pass through.	
Transverse	Lying or being across, or in a crosswise direction.	
Truncate	Of leaf base or leaf apex, appearing to terminate abruptly, as if by cutting off.	
Tubercles	Any round nodule (lump), small eminence, or warty outgrowth found on external or internal organs of a plant.	
Tufted	Growing in small dense clumps or tufts (a collection of small things in a knot or bunch, implying a dense rounded mass).	

Umbel	An inflorescence that consists of a number of short flower stalks which spread from a common point, somewhat like umbrella ribs.	
Villous	Shaggy in appearance; abounding in or covered with long, soft, straight hairs.	
Vulnerable	A species that is categorised as threatened with extinction (in line with the criteria developed by the International Union for Conservation of Nature [IUCN]) unless the circumstances that are threatening its survival and reproduction improve.	
Whorl	An arrangement of leaves, sepals, petals, stamens or carpels that radiate from a single point and surround or wrap around the stem or stalk.	

Appendices

The following regulations pertain to protected plants as listed in the provincial conservation ordinances highlighted below.

Appendix 1: Northern Cape Nature Conservation Act No. 9 of 2009

CHAPTER 6 SUSTAINABLE UTILISATION OF PLANTS

49. Restricted activities involving specially protected plants (i.e., **Schedule 1** plant species):

- (1) No person may, without a permit—
 - (a) pick;
 - (b) import;
 - (c) export;
 - (d) transport;
 - (e) possess;
 - (f) cultivate; or
 - (g) trade in, a specimen of a specially protected plant.
- (2) The provisions of subsection (1) (e), in so far as they prohibit the possession of a specially protected plant, do not apply to a landowner who is in possession of a specially protected plant which grows in its natural habitat, and which was not planted by human interference.

50. Restricted activities involving protected plants (i.e., **Schedule 2** plant species):

- (1) Subject to the provisions of section 52, no person may, without a permit—
 - (a) pick;
 - (b) import;
 - (c) export;
 - (d) transport;
 - (e) cultivate; or
 - (f) trade in, a specimen of a protected plant.

- (2) The provisions of— (a) subsection (1), in so far as they prohibit the picking, donation, receiving as a gift or conveyance of a protected plant, do not apply to the flower of a protected plant that, for the private use of the landowner, is—
 - (i) picked by the owner of the land on which the plant grows;
 - (ii) picked on that land by a family member of the owner; or
 - (iii) picked on that land by a person acting with the written permission of the owner;
- (b) subsection (1), in so far as they prohibit the import into or export from the Province, purchase or conveyance of a protected plant by any person, do not apply to a protected plant if that person can produce written permission or other documentary proof indicating that such plant was lawfully—
 - (i) bought or received as a gift from a person in another province;
 - (ii) bought or received as a gift from a person within the Province; or
 - (iii) obtained from a registered nursery.

51. Picking, receipt, possession, acquisition or handling of indigenous plants (i.e., **Schedule 3** plant species):

- (1) No person may, without a permit, pick an indigenous plant— (a) on a public road; (b) on land next to a public road within a distance of 100 metres measured from the centre of the road; or (c) within an area bordering a natural water course, whether wet or dry, up to and within a distance of 100 metres from the middle of a river on either side of the natural water course.
- (2) No person may, without a permit, pick an indigenous plant in such manner that it constitutes largescale harvesting or for commercial purposes.

- (3) No person may collect firewood or pick, transport or remove an indigenous plant on land of which such person is not the owner without the owner's written permission.
- (4) Subsection (1) (a) and (b) do not apply to the landowner or his or her relative picking an indigenous plant which is not a specially protected or protected plant.
- (5) No person may—
 - (a) receive an indigenous plant knowing that it was not picked lawfully;
 - (b) possess an indigenous plant in respect of which there is a reasonable suspicion that it was not picked lawfully and be unable to give a satisfactory account of such possession; or
 - (c) acquire or receive into his or her possession or handle an indigenous plant without having reasonable cause for believing, at the time of such acquisition, receipt or handling of such plant, that it was picked lawfully.

52. Nursery permit:

- (1) A landowner may apply in writing to the Director for a nursery permit in respect of the whole or any portion of his or her land.
- (2) An application made in terms of subsection (1) must—
 - (a) in the case of agricultural land, include a full description of the land in respect of which application is made, including but not limited to proof of ownership, the farm name, farm number, magisterial district, the farm's boundaries and size and habitat assessment reflecting the current state of the vegetation thereon;
 - (b) in the case of land situated within a township, include a full description of the property in respect of which the application is made, including but not limited to proof of ownership, the erf number, the size of the erf, the street name and number, the city or town, the suburb and magisterial district where the erf is situated;
 - (c) state the species of plant to which the application relates, the estimated

- number of such species that are to be found in its natural state on the land and the number of such species that are otherwise to be found on the land referred to in paragraph (a) or (b);
- (d) set out the grounds on which the application is made; and
- (e) set out the activities applied for.

- (3) For the purpose of deciding on the application, the Director may require the applicant to furnish him or her with any additional information he or she may consider necessary or desirable.
- (4) If the Director is satisfied that the application meets the required criteria, he or she may grant the application and, subject to the conditions he or she may consider necessary or desirable, issue the permit.
- (5) A nursery permit— (a) is valid for the period specified therein; and
 - (b) may be withdrawn by the Director if the landowner fails to comply with or contravenes any of the conditions subject to which the permit was issued.

- (6) Subject to subsection (7), any nursery permit issued in terms of this section lapses upon the transfer or lease of the land or any portion of such land in respect of which it was issued.
- (7) The provisions of section 16 (of the act), read with the changes required by the context, apply with regard to a nursery permit.

53. Application of certain provisions.—For the purpose of this Chapter, the provisions of sections 11, 12, 13, 14, 15 and 25 (2) of the act apply, read with the changes required by the context.

54. Written permission by the landowner.

- (1) No person may perform any activity as described in section 49 or 50 on land without the written permission of the landowner concerned.
- (2) The provisions in respect of land referred to in subsection (1) do not apply to the owner of such land.

- (3) For the purpose of interpretation of the words “written permission” in subsection (1), the provisions of section 14 apply, read with the changes required by the context.

Appendix 2: Western Cape and Eastern Cape Nature and Environmental Conservation Ordinance No. 19 of 1974

CHAPTER VI PROTECTION OF FLORA

63. Prohibition on picking of certain flora:

- (1) No person shall—
- uproot the plant in the process of picking the flower of any flora;
 - without a permit— (i) pick any endangered or protected flora, or (ii) pick any flora on a public road or on the land on either side of such road within a distance of ninety metres from the centre of such road, or
 - pick any protected or indigenous unprotected flora on land of which he or she is not the owner, without the permission of the owner of such land or of any person authorised by such owner to grant such permission
- (2) No permission granted in terms of subsection (1) (c) shall be valid unless it is reduced to writing and reflects—
- the full names and address of the owner of the land concerned or of the person authorised to grant such permission;
 - the full names and address of the person to whom permission is granted, and
 - the number and species of flora, the date or dates on which such flora

may be picked and the land in respect of which permission is granted, and is signed and dated by such owner or the person authorised by him or her.

- (3) The provisions of subsection (1) (b) shall not apply to the owner of any land, any relative of such owner and any fulltime employee of such owner acting on the instructions or with the consent of such owner, in respect of any protected or indigenous unprotected flora on such land.
- (4) The provisions of subsection (1) (b) (i) shall not apply to any person authorised in writing by the owner of any land to pick any protected flora on such land for the purpose of gathering and propagating the seed of such flora.

64. Sale and purchase of protected flora

No person shall—

- sell or buy any protected flora at any place other than on the premises of a registered flora grower or registered flora seller, and
- sell any protected flora without a licence issued under section 65(2).

65. Registration and licensing of flora growers and flora sellers —

- (1) Any person desiring to be registered and licensed in respect of any fixed premises as a flora grower or flora seller, as the case may be, shall apply to the [Director] Board in the prescribed manner and form for registration in terms of this section and furnish [him] it with the prescribed information and such further information as [he] it may require.
- (2) Upon receipt of any such application, the [Director] Board may cause such inspection of the premises concerned as [he] it may deem necessary to be made and if, after consultation with the local authority in whose area of jurisdiction such premises are situated and regard being had to any other information at [his] its disposal, [he] it is satisfied that the granting of such application will not be contrary to the

objectives of this Chapter, [he] the Board may, in [his] its discretion and subject to the conditions which [he] it deems fit, in the prescribed form issue to any such applicant—

- in respect of the premises concerned, a certificate of registration as a flora grower or flora seller, as the case may be, and
- on payment of the prescribed fee, a licence to sell on the premises concerned the protected flora specified by [him] it in such licence; provided that no fee shall be payable in respect of a licence to sell protected flora which has been cultivated.

- (3) [The holder of a licence issued under subsection (2) shall not be exempt from compliance with any provision of the Licences Ordinance, 1981 (Ordinance 17 of 1981), in connection with the sale of any flora.

- (4) (a) A licence issued to—
- a flora grower shall be valid for a period of twelve months from the date of issue thereof, and
 - a flora seller shall be valid for a period of three years from the date of issue thereof.

- (b) A certificate of registration as a flora grower or flora seller shall be valid until it is cancelled by the [Director] Board or, in the case where the [Director] Board does not receive an application for a new licence from a flora grower or flora seller, as the case may be, within thirty days of the expiry of the periods contemplated by paragraph (a), for the periods contemplated by paragraph (a) and for thirty days thereafter.

66. Sale of protected flora on [the] premises of registered flora growers and sellers

No person shall sell any protected flora on the premises of—

- a registered flora grower unless such flora was propagated or cultivated or occurred in a natural state on such premises;

- a registered flora seller unless such flora has been obtained from any other registered flora seller or registered flora grower, or
- a registered flora seller if such flora was propagated or cultivated or occurred in a natural state on any premises of any registered flora seller who is not registered as a flora grower in respect of such premises.

67. Sale of protected flora for charitable and other approved purposes

Notwithstanding anything to the contrary contained in this ordinance, the [Director] Board may subject to such conditions and restrictions as [he] it may deem necessary issue a permit to any person authorising such person to sell protected flora for charitable or such other purposes as the [Director] Board may approve, at a time and place specified in such permit.

68. Places for sale of indigenous unprotected flora

- (1) A local authority may in respect of the sale of indigenous unprotected flora within its area of jurisdiction set aside such places as it may deem suitable for the sale of such flora and erect such shelters or other structures as it may deem necessary thereon [and notwithstanding anything to the contrary contained in the Licences Ordinance, 1981 (Ordinance 17 of 1981), when issuing a licence contemplated by Item 32 of the First Schedule to such ordinance authorising the holder of such licence to carry on the business of selling, bartering or exchanging flowers or offering or exposing flowers for sale, barter or exchange, restrict the carrying on of such business in respect of indigenous unprotected flora to any place so set aside].

- (2) No person shall sell any indigenous unprotected flora at any place other than a place set aside in terms of subsection (1) or on the premises of a registered flora seller or registered flora grower.

69. Sale of indigenous unprotected flora by owner of land

Notwithstanding the provisions of section 68(2), an owner of land on which indigenous

unprotected flora is being propagated or cultivated or on which such flora occurs in a natural state may sell such flora which has been so propagated or cultivated or which so occurs to any person—

- (a) on such land;
- (b) at a place set aside in terms of section 68(1), or
- (c) carrying on business under a licence issued to him or her under section 65(2).

70. Export and importation of flora

No person shall without a permit—

- (a) export any flora from the Province; provided that the provisions of this paragraph shall not apply to the export by any person of any flora, except endangered flora and protected flora referred to in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973, which he or she legally obtained from any registered flora grower or registered flora seller who is the holder of a permit to export such flora contemplated

by this paragraph; provided further that such person, while he or she is exporting such flora, shall be in possession, in addition to any document contemplated by sections 71 and 72, of a document in which the number and date of such export permit of such flora grower or flora seller are reflected, or

- (b) import into the Province any protected flora specified in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973.

71. Donation of flora

The provisions of sections 41 and 43 of the Act shall apply mutatis mutandis in respect of the donation of any flora by any person to any other person.

72. Possession of flora

The provisions of sections 42 and 43 of the Act shall apply mutatis mutandis in respect of any person found in possession of any flora.



Over the past five years or so, the demand for a diversity of rare and unique succulent plant species has increased, which some have termed the 'global succulent boom', and this has impacted several succulent-rich countries. South Africa has been particularly hard hit by an increase in the illegal and unsustainable collection, smuggling and laundering of its unique succulent flora, to such an extent that the populations of several endemic species have been reduced to a point of non-viability or even extinction. Seventeen highly targeted southern African succulent plant species and one genus were included in Appendix III of CITES on 23 February 2023 at the request of South Africa, to urgently bring this growing international trade under control. Appreciating the difficulty associated with identifying species in trade, this guide presents information to assist law enforcement and border officials with the identification of live specimens of the listed species, as well as characteristics that may be used to distinguish wild-collected plant specimens from specimens artificially propagated in a controlled environment.

