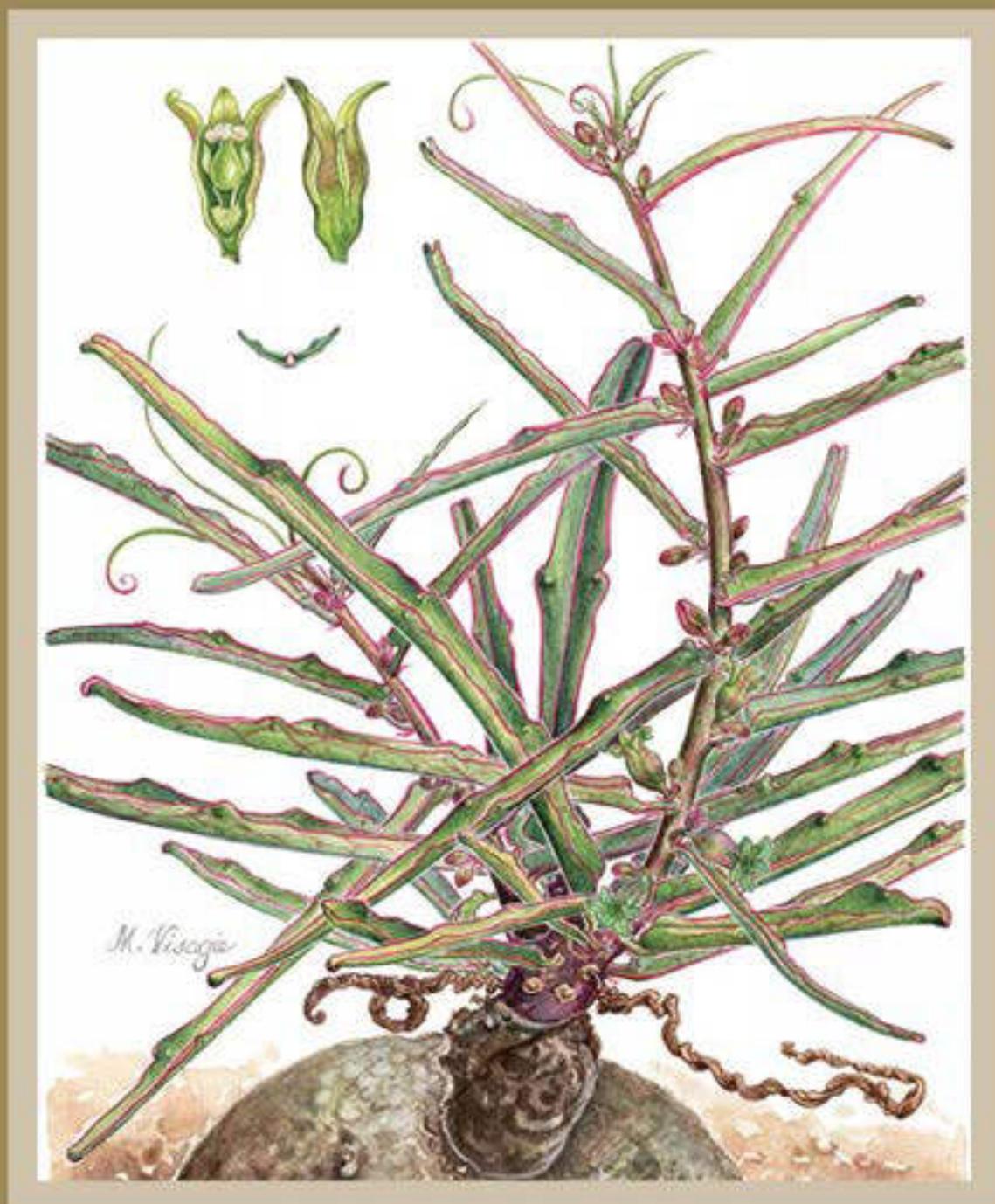


Flowering Plants of Africa

Volume 67

June 2021



Celebrating 100 years: 1921–2021

Flowering Plants of Africa

Since its inception in 1921, this serial, modelled on the former *Curtis's Botanical Magazine*, has published well over 2 000 colour plates of African plants prepared by some 80 artists.

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Cover illustration: *Adenia repanda* (Plate 2373)

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Flowering Plants of Africa

A peer-reviewed journal containing colour plates with descriptions of flowering plants of Africa and neighbouring islands

Edited by

Alicia Grobler

with assistance of

Gillian Condry

Volume 67



Pretoria
2021

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Contents

Volume 67

| | |
|---|-----|
| 2361. <i>Xerophyta adendorffii</i> . A.E. van Wyk and Jenny Hyde-Johnson | 2 |
| 2362. <i>Aloiampelos ciliaris</i> var. <i>ciliaris</i> . G.F. Smith, E. Figueiredo, R.R. Klopper, N.R. Crouch, C.C. Walker and Gillian Condry | 18 |
| 2363. <i>Aloiampelos tenuior</i> var. <i>viridifolia</i> . E.J. van Jaarsveld and Marieta Visagie . . . | 32 |
| 2364. <i>Brunsvigia radulosa</i> . M. Maswoliedza, R.J. Sebola and Gillian Condry | 42 |
| 2365. <i>Kalanchoe beharensis</i> . G.F. Smith, E. Figueiredo, C.C. Walker and Gillian Condry | 50 |
| 2366. <i>Kalanchoe crouchii</i> . G.F. Smith, N.R. Crouch, E. Figueiredo and Angela Beaumont | 60 |
| 2367. <i>Kalanchoe manginii</i> . G.F. Smith, E. Figueiredo, R. Shtein and Lesley Deysel . . | 70 |
| 2368. <i>Kalanchoe millotii</i> . G.F. Smith, E. Figueiredo, N.R. Crouch and Lesley Deysel . . | 80 |
| 2369. <i>Kalanchoe pumila</i> . G.F. Smith, E. Figueiredo and Lesley Deysel | 92 |
| 2370. <i>Kalanchoe serrata</i> . G.F. Smith, E. Figueiredo and Lesley Deysel | 104 |
| 2371. <i>Bersama lucens</i> . T. Krishanlal, H. Baijnath, Y. Singh and Gillian Condry | 114 |
| 2372. <i>Argomuellera macrophylla</i> . R.J. Sebola, M. Maswoliedza and Gillian Condry . . | 124 |
| 2373. <i>Adenia repanda</i> . E.J. van Jaarsveld, S. Venter and Marieta Visagie | 132 |
| 2374. <i>Psychotria suber</i> . E.J. van Jaarsveld, S. Venter and Marieta Visagie | 142 |
| 2375. <i>Carissa sebrabergensis</i> . E.J. van Jaarsveld, W. Swanepoel and Marieta Visagie . . | 150 |
| 2376. <i>Alectra vogelii</i> . A.E. van Wyk and Jenny Hyde-Johnson | 158 |
| 2377. <i>Thunbergia battiscombei</i> . W.R. Woodenberg, H. Baijnath, Y. Singh and Gillian Condry | 174 |
| 2378. <i>Justicia divaricata</i> . H.M. Steyn and Gillian Condry | 184 |
| 2379. <i>Barleria rigida</i> var. <i>rigida</i> . K. Balkwill, F.C. Nyirenda and Gillian Condry | 194 |
| 2380. <i>Tarchonanthus parvicapitulatus</i> . P.P.J. Herman, A.E. van Wyk and Jenny Hyde-Johnson | 202 |
| Guide for authors and artists | 216 |
| Index to Volume 67 | 220 |

New taxa published in this volume

- Aloiampelos tenuior* var. *viridifolia* (Van Jaarsv.) Van Jaarsv., comb. nov., p. 33
Aloiampelos tenuior var. *decidua* (Reynolds) Van Jaarsv., comb. nov., p. 33
Aloiampelos tenuior var. *densiflora* (Reynolds) Van Jaarsv., comb. nov., p. 34
Aloiampelos tenuior var. *rubriflora* (Reynolds) Van Jaarsv., comb. nov., p. 34
Psychotria suber Van Jaarsv. & S.Venter sp. nov., p. 143
Carissa sebrabergensis Van Jaarsv. & Swanepoel sp. nov., p. 150



PLATE 2373 *Adenia repanda*

Adenia repanda

Passifloraceae

Southern Africa

Adenia repanda (Burch.) Engl. in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 14: 375 (1891). *Paschanthus repandus* Burch. in *Travels to the Interior of South Africa* 1: 543 (1822). *Modecca paschanthus* Harv. in *Harvey & Sonder, Flora Capensis* 2: 500 (1862) nom. illegit. *Jäggia repanda* Schinz in *Verhandlungen des Botanischen Vereins der Provinz Brandenburg und die angrenzenden Länder* 30: 254 (1888). *Paschanthus jäggii* Schinz in *Mémoires de l'Herbier Boissier* 20: 23 (1900). *Modecca repanda* (Burch.) Druce in *Report of the Botanical Exchange Club of the British Isles* 5 (1916): 636 (1917).

During a botanical expedition to southern Angola arranged by Brian Huntley, a species of *Adenia* Forssk. growing in dry savanna grassland was collected on 21 January 2010 from the top of Iona Peak on the southern border of Angola (Van Jaarsveld 2010a) (Figure 1). The plants were clearly geophytic (Figure 2) and kept short by fires during the dry winter season. The *Adenia* plants grew scattered throughout the grassland at about 1 800 m elevation, all more or less the same size, with subterranean tubers. The collected plant was grown on at Kirstenbosch National Botanical Garden's succulent collection. It started flowering in summer (Figure 3) and was subsequently illustrated by Marieta Visagie. At first it was thought to represent a species new to science, but upon further investigation and the collection of additional material from two sites in the Kaokoveld in Namibia just southwest from Iona, its flowers and leaves soon revealed its true identity. It represented the variable and widespread *A. repanda* (Burch.) Engl.

Some species, as in the case of our plant, are exceptionally adaptable and are able to adjust their life form according to their habitat. The two sites where the plants occur in Namibia are quite similar to the site at Iona, just north of the Kunene River. The first Namibian site where our species was collected was at Ozorotuuu (on the Otjihipa Mountain) on 28 April 2013 during an expedition to Marienfluss (Figure 4); the second Namibian site was on the adjacent southwestern slopes of Ozorotuuu Mountain peak on 19 May 2018 (Figure 5). On both expeditions the first author (EJV) was accompanied by Wessel Swanepoel from Windhoek. This variability and plasticity of *Adenia repanda* was documented by Venter (2018) in the journal *Aloe* where two distinctive narrow-leafed forms of *A. repanda* were depicted: one illustration by Joseph Pohl in Engler (1910) and another by De Wilde (1971) from his revision of the genus *Adenia*.

Adenia is mainly confined to the paleotropics. The centres of diversity are in central Africa, Madagascar and Southeast Asia (De Wilde 1971; Venter 1993). It belongs to the Passifloraceae, a pantropical family with nearly a thousand species arranged in 28 genera and, after molecular investigations, placed within three subfamilies: Malesherbioideae, Passifloroideae and Turneroideae (Tokuoka 2012). The family is best known for its edible member,

PLATE 2373.—1, plant in flower, × 1; 2, longitudinal section of female flower, × 3.5; 3, female flower, × 4; 4, gland, × 2. Voucher specimen: Van Jaarsveld 22658 in Compton Herbarium, Cape Town. Artist: Marieta Visagie.



FIGURE 1.—Typical habitat of *Adenia repanda* at Iona Peak, southwestern Angola. Photograph: E.J. van Jaarsveld.



FIGURE 2.—*Adenia repanda* collected from Iona Peak, southwestern Angola. Photograph: E.J. van Jaarsveld.

the granadilla or passion fruit (*Passiflora edulis* Sims, subfamily Passifloroideae). *Adenia*, with about 93 species, also belongs to subfamily Passifloroideae (Christenhusz et al. 2017). Ten *Adenia* species occur naturally in Namibia and South Africa (Van Jaarsveld 1987; Smith et al. 1997). Liebenberg (1939) revised the South African species of the genus, and the last monograph of *Adenia* was by De Wilde in 1971, who also wrote up the genus for the *Flora of southern Africa* (1976) and *Adenia* species with succulent features for the *Illustrated Handbook of Succulent Plants* (Eggl 2002).

Adenia repanda belongs to the monotypic section *Paschanthus* (Burch.) Harms (1893), characterised by their subterranean tubers, axillary inflorescences and glands at the base of the leaves. Other tuberous species from the subregion, from the northern and eastern parts of South Africa and

Eswatini, belong to section *Blepharantes* (J.E.Smith) Miquel; these include *A. digitata* (Harv.) Engl., *A. hastata* (Harv.) Schinz and *A. wilmsii* Harms. The growth forms of the remainder of the South African species are diverse, from lianas such as *A. gummifera* (Harv.) Harms, a rampant-growing, green-stemmed climbing succulent in forests, to thickset shrubs from the dry savanna. Most of the South African species have some tendency to climb. *Adenia fruticosa* Burt Davy, *A. glauca* Schinz and *A. spinosa* Burt Davy have large aboveground caudices and occur in dry bushveld in Mpumalanga and Limpopo provinces of South Africa. *Adenia pechuelii* (Engl.) Harms, endemic to the northern Namib Desert, has a large caudex that can grow up to a metre in diameter with many short erect spinescent branches. These caudiciform species, which are popular among succulent plant collectors, are grown for their ornamental value and often have mottled green stems.

Adenia fruits vary in size and colour. They are almost always globose, granadilla-like, with a bright red to yellow pericarp. All parts of *A. digitata* are highly toxic. The fruits of *A. hastata* are apparently edible (Watt & Breyer-Brandwijk 1962). However, all fruits of *Adenia* although colourful, should be avoided and never tasted. According to Watt & Breyer-Brandwijk (1962) *A. repanda* is readily grazed by livestock.

Adenia repanda occurs widespread from its southernmost distribution in the lower Orange River Valley (Northern Cape Province) eastwards to North West and Limpopo provinces of South Africa, and further north into Botswana, Zimbabwe, northern Namibia and southern Angola (Figure 6). It grows at elevations of 500–1 900 m and occurs as far southwest in South Africa as the Pellaberg in Bushmanland. Its habitat is diverse, however, the species is always associated with well-drained sites. The localities in Bushmanland is situated in desert with rainfall measuring 75 mm per annum, on the margin of the winter rainfall zone. *Adenia repanda* is not a soil specialist and grows in a variety of soil types derived from quartzitic sandstone, granite and calcrete. Its active growth is during summer and almost always associated with dry arid savanna and in the west, desert (Mucina & Rutherford 2006). It usually grows as a climber to about 2 m high in shrubs or small trees. Since *A. repanda* occurs widespread and is not threatened, it is listed as Least Concern (LC) in the *Red List of South African Plants* (Raimondo et al. 2009).



FIGURE 3.—*Adenia repanda*, collected at Iona Peak, grown at Kirstenbosch National Botanical Garden. Note the globose shape of the tuber of which the surface is grey with a distinct reticulate-foveate pattern. Photograph: E.J. van Jaarsveld.



FIGURE 4.—*Adenia repanda* in habitat east of the Marienfluss. Photograph: E.J. van Jaarsveld.



FIGURE 5.—*Adenia repanda* growing on the southwestern slopes of the Ozorotuuo Mountain. Photograph: E.J. van Jaarsveld.

On a granite hill (Figure 7), just east of Moçâmedes in southwestern Angola, plants were observed growing with various species of *Commiphora* (*C. virgata* Engl., *C. angustifoliolata* Mendes, *C. glaucescens* Engl., *C. steynii* Swanepoel), *Sterculia africana* (Lour.) Fiori, *Euphorbia matabelensis* Pax and *Vachellia reficiens* (Wawra) Kyal. & Boatwr. Succulents growing here include *Tavaresia angolensis* Welw., *Aloe hereroensis* Engl., *Cyphostemma uter* (Exell & Mendonça) Desc., *Euphorbia subsalsa* Hiern, *E. eduardoi* L.C. Leach, *Portulacaria carrissoana* (Exell & Mendonça) Bruyns & Klak, *Cissus cactiformis* Gilg, *Sesamothamnus benguellensis* Welw. and stunted individuals of *Adansonia digitata* L. (Van Jaarsveld 2010a). At Iona Peak (Figure 1) plants were observed amongst grass in savanna and associated with *Senegalia montis-usti* (Merxm. & A.Schreib.) Kyal. & Boatwr.,

Peltophorum africanum Sond., *Turnera oculata* Story var. *paucipilosa* Oberm., *Dalbergia nitidula* Welw. ex Baker, *Commiphora africana* (A.Rich.) Engl. and *Sclerocarya birrea* (A.Rich.) Hochst. Associated succulents include *Cyphostemma currorii* (Hook.f.) Desc., *Kalanchoe lanceolata* (Forssk.) Pers. and *Portulacaria carrissoana* (Exell & Mendonça) Bruyns & Klak. In a grassy habitat (e.g. habitat as pictured in Figure 8), plants are subject to regular winter fires and grazing, ensuring their geophytic existence. *Adenia repanda* was also observed on 26 March 1985 growing on the lower southeastern slopes of Pellaberg, at Swartmodder, Bushmanland in the lower Orange River Valley. Here plants were observed in desert with species such as *Aloidendron dichotomum* (Masson) Klopper & Gideon F.Sm., *Boscia albitrunca* (Burch.) Gilg & Gilg-Ben., *Bowiea volubilis* Harv. ex Hook.f. subsp. *gariensis* (van Jaarsv.) Bruyns, *Brunsvigia gariensis* Snijman, *Commiphora gracilifrons* Dinter ex Van der Walt, *Eriospermum ernstii* P.L.Perry, *Euphorbia mauritanica* L., *Ficus cordata* Thunb., *Jatropha orangeana* Dinter ex P.G.Mey., *Kleinia cephalophora* Compton, *Laryleachia perlata* (Dinter) Plowes, *Pappea capensis* Eckl. & Zeyh., *Cynanchum pearsonianum* Liede & Meve, *Stapelia similis* N.E.Br. and *Tylecodon rubrovenosus* (Dinter) Toelken.

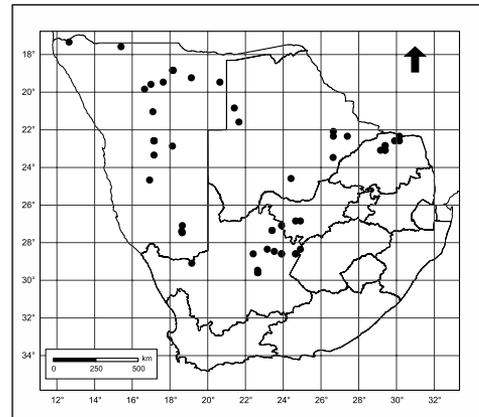


FIGURE 6.—Geographical distribution range of *Adenia repanda* in southern Africa.

Climbers with tuberous roots usually reflect a seasonally dry climate and some woody component in their habitat. Moisture is stored in their tubers to allow plants to go into dormancy for long periods of time, especially in semi-desert conditions with unpredictable and generally low rainfall with periods of drought. During favourable growing conditions, their fast-growing, climbing stems (with tendrils) allow the plants to take advantage of the support of the woody component (trees or shrubs) in its habitat as demonstrated by *Adenia repanda* (Figure 7). The plant thus takes advantage of its host's woodiness to attain its required height and maximise the position of its leaves for photosynthesis, its flowers to possible pollinators and its red fruits for dispersal. Plants growing among grass and subject to regular fires will take on a geophytic lifestyle, the regular pruning by fires causing plants to have shorter annual stems, leaves and flowers. Livestock and game will also keep the arboreal stems trimmed, thus enhancing its geophytic lifestyle. The glaucous leathery leaves (of both growth forms) is a result of a powdery bloom that help plants to reflect sunlight to cool them down. The waxy layer on the leaves also helps to reduce transpiration and subsequent moisture loss. The infolded (canaliculate) margins further reduce transpiration and surface exposure to the sun. Although the stems and leaves are reported to be heavily grazed by livestock (Watt & Breyer-Brandwijk 1962) it is not known whether their tubers, like some other species such as *A. digitata*, are very poisonous. The latter has cyanogenic compounds, a chemical defence strategy that discourages herbivory, especially during the dry season when there is a scarcity of food and water. *Adenia repanda* has another amazing ability to protect its aboveground parts. The nectar produced by the extrafloral nectaries



FIGURE 7.—*Adenia repanda* growing among granite rocks, east of Moçâmedes, southwestern Angola. Note the climbing stems making use of the woody component in its immediate habitat for support, and its conspicuous red fruit. Photograph: E.J. van Jaarsveld.

at the base of the leaves provide food for ants, which is mutually beneficial to both organisms, as the ants, in turn, rid the plants of parasites (Benson et al. 1976; Hearn 2006). This feature has been documented in most other *Adenia* species as well. The tubular flowers suggest an insect pollinator, whereas its conspicuous, reddish, three-carpeled fruit with loculicidal dehiscence that expose the seed would attract some animal agent for dispersal (Figure 7). The flattish seeds germinate during the rainy season under favourable conditions.

William Burchell (1781–1863), well-known British traveller and natural history explorer, collected plants of *Adenia repanda* in Griqualand West of the Northern Cape on 16 February 1812 in the Asbestos Mountains near Griekwastad, where he also discovered the first species of *Lithops*. He described his plant under the name *Paschanthus repandus* Burch. in the first volume of his *Travels to the Interior of South Africa* (1822) (Gunn & Codd 1981). The synonymy above reflects its taxonomic history and initial classification chaos within the group. However, stability was brought by Adolf Engler who grouped together all the relevant species under *Adenia* (1891).

The genus name *Adenia* commemorates the city Aden in Yemen in the Arabian Peninsula (Clarke & Charters 2016). The specific epithet, *repanda*, refers to its leaves of which the margin is unevenly or slightly wavy (Daydon Jackson 1917; Usher 1966).

The genus *Adenia* is also popular among collectors of succulents. They are ideal for bushveld or savanna gardens and grown for their ornamental, succulent, mottled green stems (Van Jaarsveld 2010b). Although easily grown, they rapidly rot with too much water (especially during winter, its resting season) or in soil that does not drain well. *Adenia repanda* is also grown with its tuber raised above the soil for effect. In regions outside of its natural habitat, it is best to grow it as a container plant in a glasshouse under controlled conditions. Plants should be kept completely dry during winter.

Description.—Climber (with tendrils) in savanna, growing up to 2 m high, or often remains a geophyte (tendrils absent) in grassland with frequent fires, always with subterranean tuberous root; evergreen under favourable conditions, becoming deciduous during

periods of drought. *Tuber* initially globose, becoming turnip-shaped or elongated, often becoming distorted by its rocky habitat, up to 500 mm in diameter in old specimens; surface grey with a reticulate-foveate pattern. *Branches* terete, green, mottled; up to 10 mm in diameter at base with tendrils up to 50 mm long. *Leaves* ascending spreading, leathery; lamina often canaliculate or infolded, glaucous, linear to obovate 20–150 × 2–20 mm, penniveined (4–10 pairs), veins often purplish, epidermis with a wax layer; base acute to somewhat subcordate; apex obtuse to retuse; margin entire; petiole to 10 mm long, repand, purplish; glands at base of leaf, one at each side of main vein, 1.0–1.5 mm in diameter. *Inflorescence* axillary cymes, sessile to shortly pedunculate, sometimes with short tendril, clustered, 1–5-flowered, polygamous or dioecious. *Male flowers* tuberos infundibuliform, 15–20 × 2–5 mm, greenish cream purplish-mottled; hypanthium 9–14 mm long, tubiform, calyx lobes 5.4–7.5 mm long, oblong-lanceolate obtuse; petals lanceolate, subacute 5–8 × 1.5–2.0 mm, 1–3 nerved, the margin entire or dentate-fimbriate towards apex; filaments 3.5–6.0 mm long, free, inserted about 5 mm above base of hypanthium; anthers 4–6 mm long, obtuse. *Female flowers* tubular campanulate, 8–14 × 3–4 mm; pedicel 1–2 mm long; ovary ellipsoid 2.5–4.0 mm long; style partially connate, 3-armed; stigma subglobose, papillate, 1.0–1.5 mm long. *Fruit* subglobose, 15–30 mm in diameter, pericarp coriaceous, bright red. *Seed* flattened, 2–12 mm long, suborbicular or broadly ovate. *Flowering time*: October to February (in the southern hemisphere). Plate 2373.

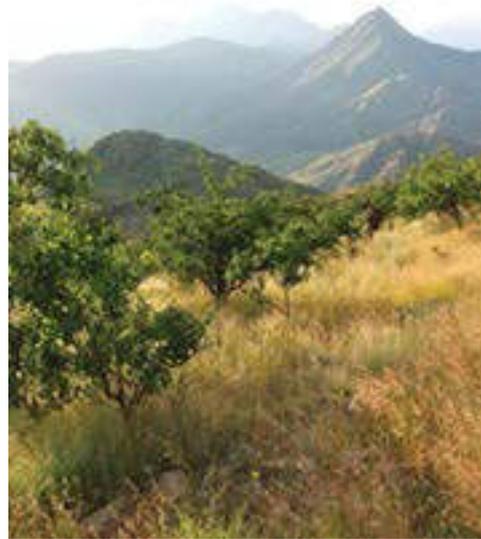


FIGURE 8.—*Adenia repanda* habitat south of Ozorotuu, Otjihipa Mountain, after the rainy season with plenty of grass, looking towards the north with the distinctive Ozorotuu crested peak in the background where the plant also occurs. Photograph: E.J. van Jaarsveld.

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