

Flowering Plants of Africa

Volume 63

June 2013



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.

The object of the serial is to convey to the reader the beauty and variety of form of the African flora, to stimulate an interest in the study, conservation and cultivation of African plants and to advance the science of botany as well as botanical art.

The illustrations are mostly prepared by artists on the staff of the South African National Biodiversity Institute, but we welcome other contributions of suitable artistic and scientific merit. Please see *Guide for authors and artists* on page 145.

A list of available back issues is given in the current *Publications Catalogue* of the Institute and on the website www.sanbi.org. Copies of this serial and of the *Catalogue* are obtainable from the SANBI Bookshop, South African National Biodiversity Institute, Private Bag X101, Pretoria, 0001 South Africa.

History of this series

(note Afrikaans translation and changes in title)

Volume 1 (1921) to Volume 24 (1944):

The Flowering Plants of South Africa

Volume 25 (1945–1946) to Volume 26 (1947):

The Flowering Plants of Africa

Volume 27 (1948–1949) to Volume 52 (1992–1993):

The Flowering Plants of Africa

Die Blomplante van Afrika

Volume 53 (1994) to Volume 63 (2013):

Flowering Plants of Africa

Cover illustration: *Erica verticillata* (Plate 2296)

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Flowering Plants of Africa

A magazine containing colour plates with descriptions of
flowering plants of Africa and neighbouring islands

Edited by

A. Grobler

with assistance of

G.S. Condy

Volume 63



Pretoria
2013

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Date of publication of Volume 62

Plates 2261–2280 1 June 2011

Next volume

Volume 64 is likely to appear in 2015.—The Editor
ISSN 0015-4504
ISBN 978-1-919976-82-2

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Crotalaria agatiflora subsp. *agatiflora*

Leguminosae

East and northeast Africa

Crotalaria agatiflora Schweinf. subsp. *agatiflora*, Schweinfurth: 13 (1892); Taubert: 206 (1895); Baker: 315 (1914); Brenan: 414 (1949); Polhill: 205 (1968). Polhill: 72-74 (1982).

Crotalaria L. is a large genus in the Leguminosae family with approximately 690 species (Lewis *et al.* 2005; Le Roux & Van Wyk 2012). The genus is distributed in the tropical and subtropical areas of the world with the majority of species found in Africa and Madagascar (Polhill 1968; Polhill 1982; Lewis *et al.* 2005). Polhill (1968) studied the genus extensively after Milne-Redhead (1961) and recognised 432 species for the African continent. About 54 indigenous species are found in southern Africa (Nkonki & Swelankomo 2003) of which four are exotic species and declared invasive alien species or weeds (Germishuizen *et al.* 2006). Other species in the genus are also known to occur in India, America and China (Lewis *et al.* 2005; Le Roux *et al.* 2011). The genus shows a remarkable diversity in its morphology, which greatly facilitates the differentiation of individual species, but variation between the species is of a markedly reticulate nature precluding any simple division of the genus into sections (Polhill 1968). *Crotalaria agatiflora* has five subspecies and subsp. *agatiflora* differs from the other four by its bracteoles which are less than 2.0(–3.5) mm long and its ovate-elliptic leaflets that are less than twice as long as broad, usually glabrous beneath. There are various common names for *C. agatiflora* subsp. *agatiflora* including bird flower, canary bird bush, rattlebox, Queensland bird flower and *voëltjebos*. The common name, rattlebox, is derived from the fact that the seeds become loose in the pod as they mature and rattle when the pod is shaken.

The plant illustrated here is indigenous to tropical East Africa and northeast Africa (Tanzania and Kenya). In southern Africa it occurs in Namibia, South Africa (Gauteng, North West, Limpopo, Mpumalanga, KwaZulu-Natal and the Western and Eastern Cape) and has become naturalised in Australia (Queensland), New Zealand and South America. Distribution of *Crotalaria agatiflora* subsp. *agatiflora* in Africa, based on the PRE Computerised Information System (PRECIS), Southern African Plant Invaders Atlas (SAPIA 2011) and Global Biodiversity Information Facility (GBIF 2013) databases, is presented in Figure 1. Canary bird bush was first introduced into South Africa as an ornamental plant. The earliest known record in the Pretoria National Herbarium is from the Johannesburg Railway Horticulture Garden dated 1921 in the Johannesburg area. According to SAPIA, the earliest record of its establishment in the wild is from the Rustenburg and Brits area in North West. It has escaped from cultivation into natural areas and has been recorded in conservation areas and reserves in Pretoria such as the Colbyn conservancy area, and Faerie Glen, Groenkloof and Wonderboom Nature Reserves (Henderson & Musil 1987; SAPIA 2011).

PLATE 2287.—1, flowering stem × 1. Voucher specimen: *Condy 251* in National Herbarium, Pretoria.
2, fruiting branch × 1. Voucher specimen: *Condy 253* in National Herbarium, Pretoria. Artist: Gillian Condy.



PLATE 2287 *Crotalaria agatiflora* subsp. *agatiflora*

Crotalaria species are widely used in Chinese traditional medicine to treat several types of internal cancers. In the United States of America some species, such as *C. pumila*, are used to treat yellow fever and skin rashes. In the Siaya area, Kenya, the roots are used as a remedy for gastrointestinal discomfort (Kokwaro & Johns 1998). *Crotalaria agatiflora* subsp. *agatiflora* is used as a medicinal plant in several African countries for the treatment of bacterial infections and cancer (Le Roux *et al.* 2011). In Ecuador *C. agatiflora* subsp. *agatiflora* is also traditionally used as a decoction to treat cancer. The above ground parts of *C. agatiflora* subsp. *agatiflora* are used in its native range to treat otitis media, a bacterial infection of ears, as well as for treatment of sexually transmitted diseases (Le Roux *et al.* 2011). In India other species of *Crotalaria* has similar uses, where it is used to treat eczema and the leaves are placed on cuts or wounds to aid the healing process. Sharma *et al.* (1967) found that *C. agatiflora* subsp. *agatiflora* relieves spasms in dogs, found to be a good relaxant, and lowered blood pressure during treatment.

A few *Crotalaria* species are consumed by humans in some parts of the world, however, many species are known to be toxic to humans and livestock. Examples include (but are not limited to) *C. oridicola*, *C. barkae*, *C. berteroana* and *C. retusa*. Toxicity has been proven in the genus *Crotalaria* to be due to the presence of pyrrolizidine alkaloids in plants and seeds (Pilbeam & Bell 1979). All plant parts of *C. agatiflora* subsp. *agatiflora* have been reported not to be toxic or poisonous.

In South Africa *Crotalaria agatiflora* subsp. *agatiflora*, is a declared category 1a species according to the National Environmental Management: Biodiversity Act (2004) and listed as a proposed invader in the Conservation of Agricultural Resources Act (1983). This species was previously misidentified as *C. agatiflora* subsp. *imperialis* (Macdonald *et al.* 2003). It grows in watercourses in Grassland and Savanna biomes; potentially invasive in forest margins and also occupies cleared grassy areas in South Africa. In some parts of the world where it has been introduced, it is regarded as an agricultural, environmental and garden weed. For example in Australia it is regarded as a minor environmental weed that has escaped cultivation and invading grasslands and areas with sandy soils (Cooperative Research Center for Australian Weed Management 2013). This is also the case in South Africa where the species has escaped cultivation and has established itself in the wild. According to herbarium material in the National Herbarium, Pretoria, *C. agatiflora* subsp. *agatiflora* is frequently collected along roads and railways, near rivers, gardens and natural habitats. Ecological data was compiled from herbarium specimens (collected from

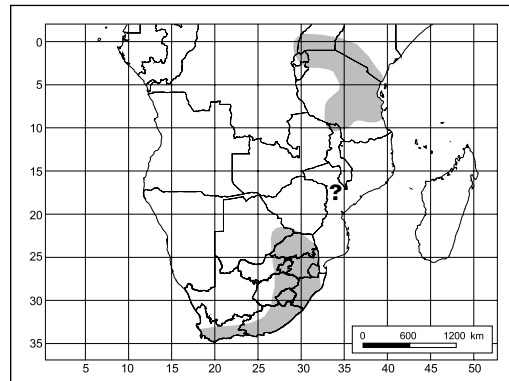


FIGURE 1.—Distribution range of *Crotalaria agatiflora* subsp. *agatiflora* based on herbarium records in the National Herbarium, Pretoria, and SAPIA and GBIF databases. The question mark (?) indicates regions of possible occurrence where records were not found.

1921–2011) and SAPIA records. Sixty-five percent were recorded near road sides, five percent along rivers, 10 percent in natural areas (including nature reserves) and 18 percent in urban areas including gardens.

Crotalaria agatiflora subsp. *agatiflora* reproduces and spreads exclusively by seeds. The average number of pods produced per plant is 50 and number of seeds per pod is 28. Seeds germinate in early summer.

Although no studies have focused on its effects on natural ecosystems, canary bird bush may affect the ecology of invaded areas in several ways for example through the enhancement of nitrogen levels in the soil. The species threatens watercourses in Grassland and Savanna biomes where it has been introduced. Furthermore, it has the potential to invade forest margins and often occupies cleared grassy areas and disturbed sites.

Description—Perennial woody herb, 0.3–2 m high, usually much branched, glabrous. *Leaves* 3-foliolate; leaflets ovate-elliptic, 25–90 × 10–35 mm, glabrous to densely hairy; petioles 30–120 mm long, mostly longer than leaflets. *Stipules* linear and caducous or absent, 4–12 mm long. *Racemes* stoutly pedunculate, many-flowered; flowers 40–50 mm long; bracts linear to attenuate-lanceolate, up to 16–20(–24) × 1–6(–9) mm; bracteoles filiform, 0.5–3.5 mm long. *Calyx* 18–30 mm long, with upper and lateral lobes joined almost to tips on either side, ± twice as long as tube; pedicels about 15 mm long, glabrous-glaucous or villose. *Standard* ovate, lemon-yellow to greenish yellow, sometimes medially pubescent outside; wings half to two-thirds as long as keel; keel broadly rounded, with a relatively short, projecting, often greenish or purplish beak, 11–55 mm long. *Pod* oblong-clavate, narrowed to a 15–25 mm long stipe, ± 75–100 mm long, glabrous. *Seeds* tumid, 6–7(–9) mm long, ± smooth. *Flowering time*: January–December in South Africa. Plate 2287.

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Plumbago pearsonii

Plumbaginaceae

Namibia

Plumbago pearsonii L.Bolus in *Annals of the Bolus Herbarium* 3: 7 (1920).

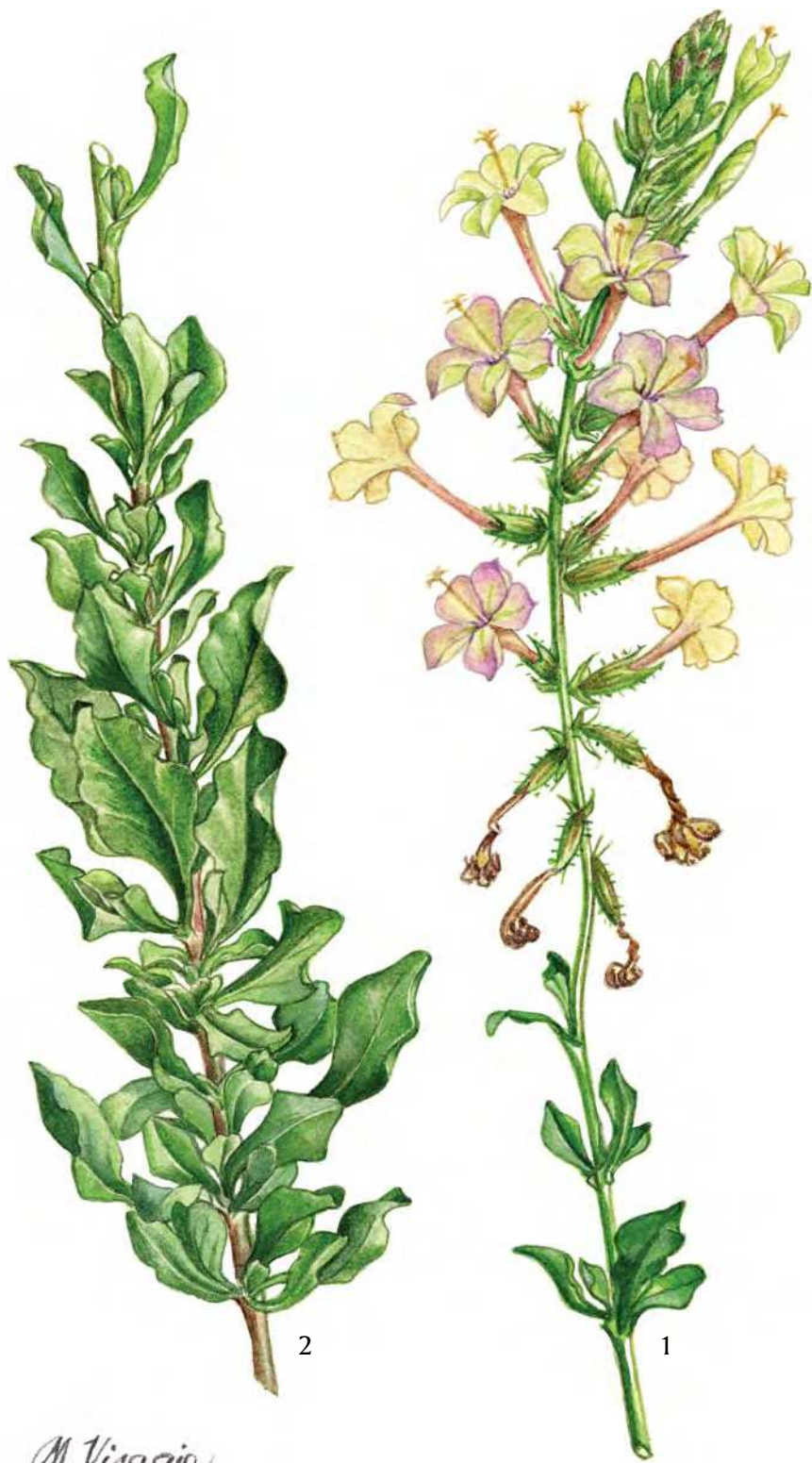
Plumbago pearsonii is a little-known, spreading shrub from the foothills and valleys of the Great Escarpment mountains in the Rehoboth and Maltahöhe districts of Namibia (Figure 1). It is at once distinguished by its grey-green to silvery, lepidote leaves and pink to violet-purple flowers borne in summer. *Plumbago pearsonii* is related to both *P. hunsbergensis* from the Hunsberg further south and *P. wissii* from the Brandberg further north, but its broad grey-green leaves are distinctive. For a comparison of the three species, the reader is referred to Plate 2273 (Van Jaarsveld *et al.* 2011) in the previous volume of *Flowering Plants of Africa*.

Our plant is up to about 0.6 m tall and 1 m in diameter, and although the illustration does not show, it has ribbed stems. At the foot of the Naukluft Mountains on the farm BuellSPORT near Rehoboth, it was observed in a valley of arid savanna with *Acacia karroo*, *A. mellifera* subsp. *detinens* and *Boscia albitrunca*. It is locally scattered on stony, dry stream banks. The mainly summer and autumn rain in the region amounts to about 250–350 mm per annum. The illustrated plant was drawn from material collected at BuellSPORT by one of us (EjvJ) and cultivated at Kirstenbosch National Botanical Garden. The flowers are yellow with a pinkish tinge at first and are carried in an ascending to horizontal position. After pollination, they bend down, with the calyx then adpressed against the stem in an almost vertical position, the corolla becoming pink to violet-purple with age.

Plumbago pearsonii is variable in leaf colour. Photographs sent to EjvJ by Pikkie Hoffman (Windhoek), which she took in the Namib-Naukluft Park, show the leaves being very silvery in colour. Often observed in desert species, this grey-green to silvery colour is possibly an adaptation to reflect sun radiation typically experienced in hot, dry desert conditions. However, when grown under nursery conditions and ample shade is provided, the leaves become greener. The plant illustrated was grown under light shade and consequently is not as grey-green as in its native habitat. In its native habitat and cultivation, plants are able to adjust leaf colour according to ambient environmental conditions. Theoretically, in nature trees can sprout and grow causing *P. pearsonii* to become shaded. When grown in shade, the plants become less grey as evident in our illustrated plant.

The name *Plumbago pearsonii* honours Professor H.H.W. Pearson [1870–1916]. Born and educated in England, he was a Cambridge student and in 1903 was

PLATE 2292.—1, flowering branch, × 1; 2, basal part of leafy branch (leaves more grey-green to silvery in its native habitat), × 1; Voucher specimens: *Van Jaarsveld 19885* in Windhoek Herbarium, Windhoek; live specimen 328/06 in Kirstenbosch National Botanical Garden. Artist: Marieta Visagie.



M. Visagie

appointed in the Harry Bolus professorship of botany at the South African College (now University of Cape Town) (Glen & Germishuizen 2010). In 1913, he became the first director of the then National Botanic Gardens with its headquarters at Kirstenbosch. He collected *Plumbago pearsonii* during an excursion to present-day Namibia in 1907 and Louisa Bolus named it in his honour in 1920.

With its silvery to grey-green leaves, *Plumbago pearsonii* is an attractive shrub with ornamental value, especially for arid semidesert and desert gardens (Van Jaarsveld 2010). It is drought tolerant and does well in cultivation, growing very easily from soft-tip to semihardwood cuttings, rooted in summer, as well as from seed. It can also be grown from stolons or side shoots, rooted in a container. The plants adapt well to cultivation under glass at Kirstenbosch where it flowers throughout spring and summer. Its close relative, *P. hunsbergensis*, also flowers in spring and summer and *P. wissii*, the other related species, mainly in summer. The plants can be pruned back hard when they become untidy and will then re-sprout.

We are grateful to Holger Kolberg of the Ministry of Environment and Tourism in Namibia for plant collecting permits. We are also indebted to our colleagues Werner Voigt, Freddie van Wyk and the late Kobus Kritzingner who assisted us at Buellspport, habitat of *Plumbago pearsonii*.

Description.—Ascending, spreading, multistemmed, stoloniferous shrub usually ± 0.6 m tall and up to 1 m in diameter; vegetative parts with white resinous exudate. *Stolons* horizontal, with erect aerial branches. *Branches* woody at base, 4–5 mm in diameter, tinged reddish; younger branches distinctly ribbed (up to 7–9 ribs), ± 2.5 –3.0 mm in diameter, greyish green; nodes 15–20 mm apart. *Leaves* ascending, alternate, petiolate; lamina decurrent, spatulate, (17–)25–38 \times 8–18 mm, subcoriaceous, apex obtuse to subacute, base attenuate and decurrent on petiole and partially amplexicaul, auriculate, surface grey-green to silvery grey-green, beset with glandular hairs, becoming glabrescent, veins parallel, somewhat translucent; margin entire, wavy in upper half; petiole 8–20 mm long, but often indistinct. *Inflorescence* a terminal raceme, 170–250 mm long; all parts densely glandular hairy and with one pair of bracts below inflorescence. *Flowers* heterostylic, alternately arranged, 20–30 mm apart at base becoming denser towards apex; pedicel 1–2 mm long. *Bracts* linear-spathulate, 11.0 \times 3.5 mm, auriculate at base; floral bracts 3, at base of each flower, the one larger, linear-triangular to triangular, 4.5–5.0 \times 2.5 mm, the other 3.0 \times 1.5 mm; base sagittate, glandular-hispid. *Calyx* 5-lobed, tubular, 8.0 \times 2.5 mm, dark to blackish green, densely glandular hairy; lobes linear-lanceo-

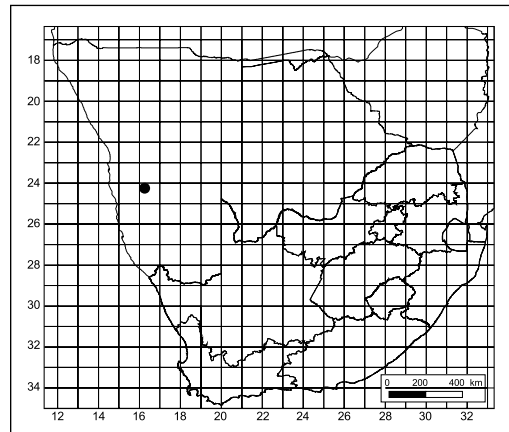


FIGURE 1.—Known distribution of *Plumbago pearsonii*.

late, hyaline between ribs but free for up to 2.5 mm. *Corolla* yellowish (yellow group 2d, Royal Horticultural Society Colour Chart), becoming violet-purple (red group 55d), opening during the day, 15–17 mm in diameter when fully opened, with slender pale rose-pink tube 25.0×1.3 mm, gradually widening to 2.5 mm at throat, midribs whitish; lobes obovate, 8×6 mm, apex obtuse. *Stamens* 32 mm long in thrum flowers, 26–27 mm long in pin flowers; filaments white; anthers oblong, 1.50×0.35 mm, blackish, pollen cream-coloured. *Ovary* tapering, linear-ovate, $1.5\text{--}2.0 \times 0.5$ mm, green; style 20 mm long in thrum flowers, 23 mm long and exerted for 4 mm in pin flowers, 5-lobed, lobes 1 mm long, papillose. *Capsule* membranaceous, circumscissile, 7.0×1.5 mm. Plate 2292.

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