

## 715. CERATOTHECA TRILOBA

Pedaliaceae

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**Summary.** The history, taxonomy, life cycle and cultivation requirements of the southern African and southern Tropical African annual or occasional biennial *Ceratotheca triloba* (Bernh.) Hook. *f.* are given, accompanied by a painting and habitat photograph.

The genus *Ceratotheca* Endl. consists of five species of annuals, biennials or small shrubs, all endemic to Africa's vast summer rainfall zone, (Abels, 1975). *Ceratotheca triloba* (Bernh.) Hook. *f.*, the most often cultivated species, occurs in all southern African countries except Lesotho and Namibia, and is concentrated in the eastern parts of South Africa extending from the Eastern and Northern Cape to Limpopo in the far north, into Mozambique, Zimbabwe, Zambia and Angola in southern Tropical Africa. The four remaining members are the annual *C. integribracteata* Engl. from Angola and Namibia, the perennial *C. reniformis* Abels from Angola, the annual *C. saxicola* E.A. Bruce, limited to the Soutpansberg Centre of Endemism in Limpopo, and the annual *C. sesamoides* Endl., the false sesame, a frequently cultivated leaf and flower vegetable which is widespread across most of sub-Saharan Africa and absent only from Angola, Ethiopia, Somalia, South Africa and a few smaller countries.

*Ceratotheca* is closely related to *Sesamum* L. of sub-Saharan Africa, India and Sri Lanka (the source of sesame seeds and oil from the ancient crop plant *S. orientale* L.), which differs mainly in its fruits that lack lateral horns. A prominent characteristic in the essentially African family Pedaliaceae is a unique type of mucilage hair which covers the leaves and other plant parts, not encountered anywhere else in the plant kingdom. The hair stalk bears a rounded head consisting of four cells with heavily thickened outer cell walls which, upon contact with water, dissolve, producing copious amounts of mucilage (Ihlenfeldt, 2004).

The genus *Ceratotheca* was established by Prof. Stephan Endlicher (1804–1849), Director of the Botanical Garden of Vienna, when he described *C. sesamoides* in *Linnaea* (Endlicher, 1832). *C. triloba* was first recorded by the naturalist and author William Burchell at

Chue Spring (now Heuningvlei) in southern Botswana, in 1812. It was originally described as *Sporledera triloba* by the German botanist Johann Bernhardt (1774–1850), Professor of Botany at the University of Erfurt and Director of the Botanical Garden there, from material gathered by the horticulturist and botanical collector J.F. Drège at an unrecorded locality in South Africa (Bernhardt, 1842). In 1886, seeds of this species were sent to Kew by John Medley Wood, Curator of the Durban Botanic Gardens, where they flowered in September the following year. The species was subsequently transferred to *Ceratotheca* and the new combination made by J.D. Hooker in *Curtis's Botanical Magazine*, with an accompanying watercolour and pencil illustration by Matilda Smith (Hooker, 1888). The genus was monographed fairly recently by Jürgen Abels in 1975.

The generic epithet *Ceratotheca* is derived from the Greek *kerato* (horned) and *theke* (a case) and is descriptive of the distinctive sharply horned capsules; *triloba* refers to the deeply three-lobed lower leaves. Commonly known as AFRICAN FOXGLOVE or WILD FOXGLOVE, *C. triloba* is used in traditional medicine by the Zulu people in southern Africa to treat painful menstruation, stomach cramps, nausea, fever and diarrhoea (Pooley, 1998). Although the leaves and stems give off an acrid smell when bruised, *C. triloba* is sometimes eaten as a leaf vegetable by indigenous peoples of the region. A chemical analysis of traditional South African leafy plants, including *Ceratotheca triloba*, to determine their safety for human consumption, was carried out in the Department of Biotechnology at the Durban University of Technology. It was found that *C. triloba* did not contain cyanogenic glycosides and that organic extracts of it were considered non-toxic. However, aqueous extracts were considered toxic above 100 µg/ml (Mudzwiri, 2007).

The species is pollinated by honey bees that feed on its nectar and gather pollen. Carpenter bees also visit the flowers but, being too large to enter, 'rob' nectar by piercing the base of the perianth tube.

The accompanying illustration by Vicki Thomas was painted in January 2010 from seeds sown in the spring of October 2009 at Kirstenbosch National Botanical Garden. This accession was collected in the wild by F.G. Carnegie in 1921, and continuously propagated from seed here ever since (*Carnegie s.n.*, in NBG). The accompanying photograph was taken along a gravelly road verge



Plate 715 *Ceratotheca triloba*

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near Barberton in Mpumalanga in northeastern South Africa, close to the border with northern Swaziland, during a visit to the area in December 2010 (Fig. 1).



Fig. 1. *Ceratotheca triloba*. A mauve form growing along a road verge near Barberton in eastern Mpumalanga, north-eastern South Africa, December 2010. Photograph: Graham Duncan.

**CULTIVATION.** *Ceratotheca triloba* is an outstanding summer- and autumn-flowering plant for mass displays and rock garden pockets, as a tall border or backdrop to lower-growing plants, or even for containers in the greenhouse. It is fast-growing, has a long flowering period and is equally effective when planted in stands of a single colour, or in a mixture of different shades. It needs full sun and at Kirstenbosch performs admirably in a well-drained, slightly acid granitic soil.

Although the elongate spike carries numerous flowers, there are usually only two open at a time, and never more than four. Each flower lasts just 2–3 days, but a succession is produced from the main stem over a period of many weeks, and the flowering period is extended by those produced from the lower branches. Apart from insect visits, the species appears self-fertile and a heavy seed set is usual. Capsules develop rapidly and are frequently well developed at the base of the stems while the upper portions are still in bloom.

In mild climates the plants can be persuaded to continue for a second year by lightly pruning the branches after flowering and removing all developing capsules, but they are best raised from seeds every spring as seedlings have greater vigour. The plants can be encouraged to become bushier by pinching out the main stem once the plants are about 20 cm high. *C. triloba* is seldom seen in gardens in South Africa but is widely grown in the USA, and has become naturalized in parts of that country (Kartesz & Gandhi, 1992) including Florida.

Seed is sown in spring in trays in the greenhouse a few weeks before the last frost, or in outdoor seed beds in mild climates, and will often seed itself from year to year. Germination takes place within 8–14 days and seedlings are pricked out when 3 weeks old, and spaced about 30 cm apart. Following an initial drench to establish the plants, only occasional drenching is required in summer. Seed capsules should be allowed to dry on the plant, and cleaned seeds are best stored at low temperature to preserve viability.

***Ceratotheca triloba*** (Bernh.) Hook. *f.*, Curtis's Botanical Magazine 114, t. 6974 (1888).

*Sporledera triloba* Bernh., *Linnaea* 16: 42 (1842). Type: South Africa, precise locality unknown, *Drège s.n.*, (MO!, holotype, sub. 391285; K!, isotypes).

*Ceratotheca lamiiifolia* (Engl.) Engl., *Botanische Jahrbücher* 19: 156 (1894).  
*Sesamum lamiiifolium* Engl., *Botanische Jahrbücher* 10: 256, t. 8 (1898). Type:  
South Africa, Northern Cape, Kuruman, at foot of Gamnani Mountain,  
*Marloth* 1074 (PRE!, isotype).  
*Sporledera kraussiana* Bernh., *Linnaea* 16: 41 (1842). Type: South Africa,  
KwaZulu-Natal, near Umlaas River, *Kraus* 179 (K!, isotype).  
Additional illustrations: Batten, A. *Flowers of Southern Africa*: 75 (1986); Phillips,  
E.P. *The Flowering Plants of South Africa* 3, t. 87 (1923).

**DESCRIPTION.** Erect, branched, summer-growing *annual* or occasional *biennial herb* 1.0–1.8 m high, vegetative parts giving off acrid smell when bruised; root system strongly branched. *Stems* rigid, four-angled, main stem purple (mauve forms) or green (white forms); branches opposite, 16–62 cm long, produced near base to midway up main stem, covered with short, soft white hairs. *Leaves* opposite to sub-opposite, shape variable, light to dark green, surfaces strongly grooved, covered with short soft white hairs, margins dentate; lowermost leaves large, deeply three-lobed, dorsal lobe 10–11 × 6–10 cm, lateral lobes 4–10 × 4–6 cm, petioles 6–12.5 cm long, petioles yellowish green to purple, uppermost leaves narrowly to broadly lanceolate, 15–35 × 2–20 mm, petioles 3–10 mm long. *Inflorescence* an erect, elongate raceme 30–75 cm high; pedicels erect to suberect, 3–4 mm long, brownish purple, pubescent. *Flowers* foxglove-like, nodding, pure white, pink or mauve, produced in pairs, unscented. *Calyx* five-lobed, sepals lanceolate, 8–10 × 2–3 mm, erect to narrowly spreading, purple, green, or green with purple margins and midribs, fused near base, persisting until fruit maturation, covered with mucilage and short, soft white hairs. *Corolla* five-lobed, white, pink or mauve, lobes fused, very brittle, outer surfaces covered with short, soft white hairs, inner surfaces smooth; corolla tube funnel-shaped, 8–10 × 7–9 mm, curved, white, or deep purple striped white; lateral lobes obtuse, 8–10 × 12–15 mm, margins slightly undulate, dorsal lobe margins slightly undulate, free portion 8–10 × 28–30 mm, inner surface with fine light purple striations; anterior lobe enlarged, free portion 20–25 × 18–20 mm, upper surface streaked with fine longitudinal striations from base of tube almost to top of lobe, striations light purple (mauve forms) or faint brown (white forms). *Stamens* 4, declinate, held just below corolla roof; filaments white, free portion turned inwards, lower two 12–14 mm long, upper two 16–18 mm long, basal filament portion adnate to tube; anthers oblong, 5 × 1 mm, pollen cream. *Ovary* rectanguloid, 6–7 × 2–3 mm, light green, densely covered with short, soft white hairs; style white, slightly declinate, 21–25 mm long, stigmatic branches 2 × 1 mm. *Fruit* a hard, rectanguloid capsule, 20–25 × 6–8 mm, loculicidally dehiscent, erect, four-chambered, upper two ends each terminating in a hard, sharp lateral horn 6–7 mm long. *Seeds* numerous, pear-shaped, 2 × 2 mm, flat, dark brown. *Chromosome number*: 2n = 32 (Ihlenfeldt, 2004).

**HABITAT.** Hill slopes and sandy flats, frequently in disturbed sites or abandoned farmlands and along gravelly road verges, in full sun.

**DISTRIBUTION.** Widespread in summer rainfall parts of Angola, Botswana, Mozambique, South Africa, Swaziland, Zambia and Zimbabwe.

FLOWERING TIME. Late October to early April, with a peak in January and February.

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