

Gladiolus filiformis, a poorly known species from North West Province, South Africa

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Background: *Gladiolus filiformis* was described in 1998 from only the type specimen, which was collected in 1977.

Objectives: The aim of this article was to expand our knowledge of the morphology, distribution, ecology, and conservation status of this poorly known species.

Method: Data presented were based on field observations, with dissections and diagnostic descriptions conducted in the field.

Results: A comprehensive account of the morphology, distribution, ecology and conservation status for *G. filiformis* was presented for the first time.

Conclusion: *Gladiolus filiformis* is more common than previously thought. The species is not an edaphic specialist and it occurs mainly on sediments of the Transvaal supergroup. Its heteromorphically winged fruit were described here, showing an intermediate form between *Gladiolus pretoriensis* and *Gladiolus oatesii*.

Introduction

The North West Department of Economic Development, Environment, Conservation and Tourism is presently conducting a biodiversity inventory of the rare, endangered and endemic plants in the province, including *Gladiolus filiformis*, which is considered to be rare and endangered.

In December 2010, *G. filiformis* Goldblatt & J.C. Manning was rediscovered by the authors. This species was previously known only from its type locality and was described from a single herbarium specimen (Goldblatt & Manning 1998).

The aim of this article is to expand our knowledge of the morphology, distribution, ecology and conservation status of this poorly known species.

Research method and design

All presently known populations of *G. filiformis* were surveyed over a period of three flowering seasons, from December 2010 to February 2013. Approximately 300 live plants were examined.

Live plants were measured and dissected in the field. Distribution and ecological data were captured with the aid of a Trimble Juno ST, Personal Digital Assistant. Co-ordinates were recorded using datum WGS 84. All data gathered from the biological surveys are stored in a Global Information System database to be incorporated into the planned Biodiversity Information Management System for North West Province.

Landowners' permission was obtained for this study and no permits were required. Specimens were deposited in the Compton Herbarium (NBG) and Herbarium Soutpansbergensis (ZPB).

Taxonomic treatment

Gladiolus filiformis Goldblatt & J.C. Manning in *Gladiolus* South Africa: 182 (1998).

Type: SOUTH AFRICA: 'North Eastern Cape' [North West Province]: [2525: Mafikeng], Gopane Mountains, rocky koppie, rocky red soil, altitude 1100 m.a.s.l. [sic], [(-BD)], 29 Dec. -1977, C.P. Peeters, N.P. Gericke & G.G. Burelli 509 (PRE, holo.!).

Description

Plants: 350 mm – 500(–720) mm tall. *Corm:* obconic, up to 30 mm in diameter, ivory coloured; tunics of reticulate fibres. *Cataphylls:* brown, membranous, protruding about 20 mm above ground. *Leaves:*

usually three, occasionally four, basal leaves reaching to base of inflorescence, second leaf sheathing lower third of stem, blades terete and four-grooved with margins and veins thickened, 1.0 mm – 2.5 mm in diameter. *Stems*: erect, usually simple, up to 2 mm in diameter. *Inflorescence*: a (5–)6 mm – 10(–12) mm flowered spike. *Bracts*: green tinged, reddish at apex, drying after anthesis, outer bracts 9.3 mm – 24.4 mm × 3.8 mm – 7.0 mm long, inner bracts 0.833–1.000 times shorter than outer bracts. *Flowers*: usually light mauve, rarely tinged pink, dorsal tepal usually dark lilac with burgundy markings at base; upper lateral tepals midrib burgundy on the inside; lower lateral tepals with various white and darker markings, apex with two burgundy lines on outside; lower median tepal with or without various white and darker markings, base with single or double burgundy line on the inside; unscented by day. Length of flower measured from base of tube to tip of dorsal tepal (49.2–)51.2 mm – 64.0(–70.0) mm long; perianth tube filiform, curved, (25.4–)27.1 mm – 36.5(–40.8) mm long; dorsal tepal elliptic to broadly elliptic (19.8–)20.3 mm – 24.1(–24.8) mm × (14.7–)14.9 mm – 19.3(–22.0) mm, apex acute, base tapering; upper lateral tepals elliptic (15.1–)15.9 mm – 21.6(–25.0) mm × (9.1–)9.7 mm – 11.9(–13.6) mm, apex acuminate, base tapering; lower lateral tepals elliptic to narrowly elliptic (14.6–)15.4 mm – 18.3(–20.3) mm × (5.8–)5.9 mm – 8.8(–10.6) mm, apex acuminate, base attenuate; lower median tepal elliptic (14.6–)15.4 mm – 18.3(–20.3) mm × (6.5–)7.3 mm – 10.3(–11.7) mm, apex acuminate, base tapering. *Stamens*: outer filaments from ovary (31.7–)32.8 mm – 42.1(–45.5) mm long, unattached section (9.2–)10.3 mm – 13.0(–14.2) mm long; median filament from ovary (32.5–)33.5 mm – 43.5(–47.3) mm long, unattached section (8.6–)10.6 mm – 13.9 mm long; anthers (5.3–)5.9 mm – 8.1(–9.0) mm long, yellow. *Ovary*: ovoid (2.5–)2.9 mm – 4.2(–4.4) mm long; style (31.8–)37.7 mm – 49.8(–54.2) mm long, branching at apex, branches (2.8–)3.0 mm – 4.6(–6.0) mm long. *Capsule*: ellipsoid, 7.7 mm – 11.8 mm long. *Seeds*: irregularly shaped, 1.8 mm – 3.1 mm long, brown, surface granulate, wings heteromorphous (wings of different shapes), apical wing 0.9 mm – 2.4 mm long; basal wing 0.2 mm – 0.7 mm long, lateral wing 0.2 mm – 0.5 mm long with the opposing wing usually absent or underdeveloped. *Flowering period*: Mainly December, but can extend from October to February (Figure 1).

The north-western plants, including the type, are smaller than those found to the south-east. The inflorescences of the type specimen have only two flowers but the plant was described as having five flowers. Five flower inflorescences are the lower limit for this species, with the number usually lying between six and ten, with an upper limit of twelve observed. The flowering structure of the type specimen is also smaller than those observed. The perianth tube of the type specimen was stated as approximately 20 mm, whereas the length in the plants studied was found to be between 27.1 mm and 36.5 mm, with the lower and upper limit between 25.4 mm and 40.8 mm. The shape, length and colouration of the dorsal tepals, upper tepals, lower lateral tepals and lower median tepals are described for the first time as they were omitted in the original description of *G. filiformis*. The rare pink form of *G. filiformis* has not been recorded before. The unattached

outer and median filament sections were found to be of different sizes with the latter usually shorter; this suggests a possible diagnostic feature. No fruiting characteristics were recorded for the species prior to this study. The newly described heteromorphically winged seeds of *G. filiformis*, with the lateral wings absent or underdeveloped and the apical wing up to 2.4 mm long, are intermediate between the wingless seeds of *Gladiolus pretoriensis* and the broad, evenly winged seeds of *Gladiolus oatesii*, which are up to 5 mm long (Lewis, Obermeyer & Barnard 1972).

Related taxa

Gladiolus filiformis has an elongated, recurved, filiform perianth tube, which is diagnostic of the species (Goldblatt & Manning 1998). *Gladiolus pretoriensis* Kuntze is similar and is also a Southern Bankenveld endemic, but it is usually a smaller plant with smaller pink flowers. *Gladiolus pretoriensis* fruits are said to be wingless, whilst those of *G. filiformis* are heteromorphically winged. *Gladiolus filiformis* could also be confused with *G. oatesii* Rolfe, but this species has a funnel-shaped perianth tube and linear, as opposed to lanceolate, leaves.

Distribution and ecology

The type locality is stated as Gopane Mountains on a rocky koppie, growing in rocky red soil at an altitude of 1100 m.a.s.l. The Gopane Mountains are not indicated on any map, but two towns with the name are. The first reference applies to the remains of an old military base east of Skilpadhek Border Post (2525BC). The whole area around the base is above 1220 m.a.s.l. and we could find no rocky koppie with red soil in the vicinity. The second Gopane is the town in which the Livingston Mission Station (2525BD) is situated. Most of the area is above 1180 m.a.s.l. and there is a rocky koppie to the north-west, with red soil. This koppie is known as Sedukwane (1303 m.a.s.l.). It was on this koppie that we located *G. filiformis* at an altitude of 1290 m.a.s.l., hence this is most likely the type locality (Figure 2). Peeters, Gericke and Burelli, who collected the type, are therefore most probably in error as it is impossible for *G. filiformis* to have been collected at an altitude of 1100 m.a.s.l.

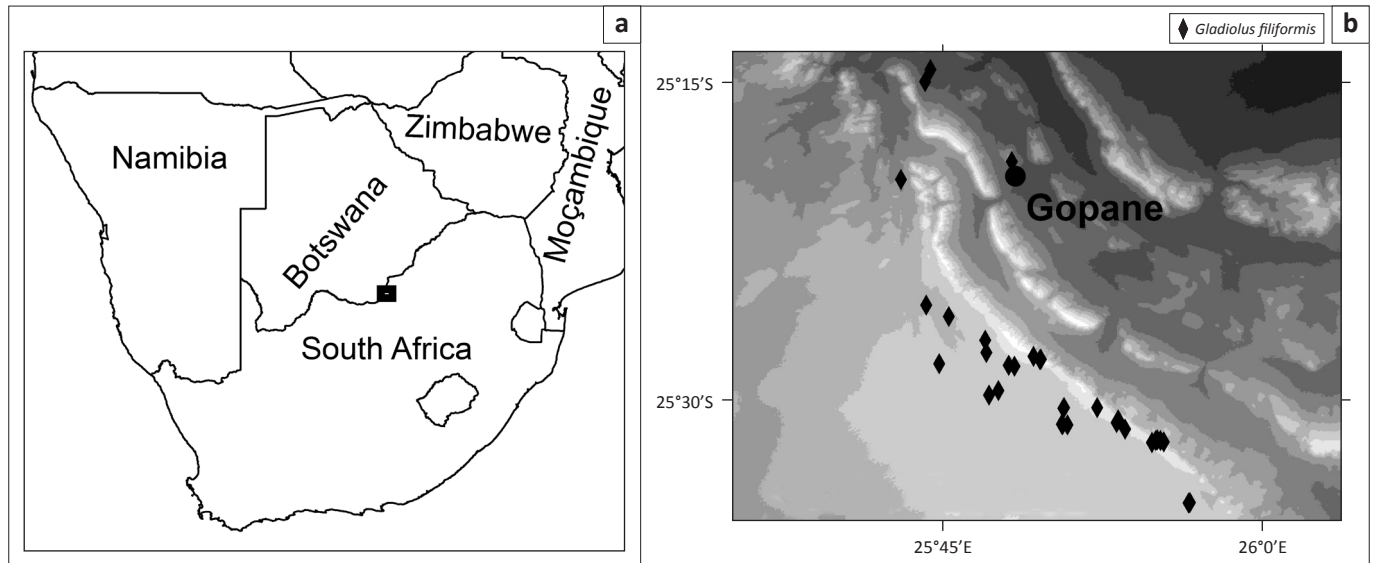
Gladiolus filiformis is presently only known from the extreme western sections of the Southern Bankenveld (Partridge *et al.* 2010), where it grows on hills, hill slopes and plateaus. The plant is not an edaphic specialist, having been observed growing in soils derived from sediments of the Transvaal supergroup, comprising banded ironstone, conglomerate and chert or dolomite areas. The type locality is situated on a dolerite koppie, the remains of a post-Transvaal supergroup volcanic plug. Most populations of *G. filiformis* occur in grassland, except for those towards its western extremities, including the type locality, which are found in open scrubland. Its presently known distribution, from the north-west (Maphephane) to its south-eastern extremity (Tweefontein), stretches across an expanse of 40 km.

Gladiolus filiformis was found growing sympatrically with *Gladiolus permeabilis* Delaroche subsp. *edulis* (Burchell ex



Source: Illustrations by Hermien Roux
Scale bar: (a) 4.0 mm; (b) 3.6 mm and (c) 0.5 mm.

FIGURE 1: *Gladiolus filiformis* vegetative and reproductive morphology depicting, (a) inflorescence, (b) capsules – open and unopened and (c) seed.



Source: Figure provided by Norbert Hahn

FIGURE 2: Distribution of *Gladiolus filiformis*, (a) regionally within South Africa and (b) locally within North West Province.

Ker Gawler) Obermeyer, but not with its near relatives *G. pretoriensis* or *G. oatesii*.

Conservation status

A word of caution is necessary in attempting a conservation assessment of this species. Flowering of the species was prolific in the seasons of December 2010 and December 2012 – January 2013 as a result of good rains in the beginning of December in both seasons, with plants flowering in their thousands. The period of October 2011 – February 2012 was a poor rainfall season, with only a few plants flowering. In the good seasons the plants bloomed mainly from December to January, whilst in the poor times they flowered sporadically from October to February.

At the type locality, grazing by goats could pose a threat, a road runs through two of the southern populations, a radio station is built at the third population and a pipeline transects the eastern populations. Notwithstanding the above there are no indications of the populations declining.

The present known extent of occurrence of this species is 287 km², thus it does not qualify as 'Critically Rare' (Goldblatt & Victor 2009). The estimated number of mature individuals far exceeds 100 000 and the populations seem stable, thus excluding criteria VU C or VU D1 (International Union for Conservation of Nature 2001). A status of 'Least Concern' is proposed, but this will need to be revised if future mining activities are embarked upon in the area.

Additional collections

BOTSWANA: Troverston, 25°14'30.024" S, 25°44'07.104" E, 11 Jan. 2013, *N. Hahn* 3038 (NBG, ZPB). **SOUTH AFRICA:** **North West Province:** Sedukwana, 25°17'59.520" S, 25°47'55.038" E; 25°28'44.538" S, 25°50'12.276" E, 15 Dec. 2010, *N. Hahn* 2767, 2772 (NBG, ZPB); Moilwas,

25°26'37.992" S, 25°49'11.016" E, 16 Feb. 2013, *N. Hahn*, 3053 (ZPB); Tweefontein, 25°32'53.052" S, 25°55'42.618" E, 01 Jan. 2013, *N. Hahn* 3033 (NBG, ZPB).

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

H.R. (North West Provincial Government) assisted with fieldwork and data capture, helped write the manuscript and drew the accompanying plate. N.H. (North West Provincial Government) did most of the fieldwork, the dissections for the diagnostic description and wrote most of the article.

References

- Goldblatt, P. & Manning, J.C., 1998, *Gladiolus in southern Africa*, Fernwood Press, Vlaeberg.
- Goldblatt, P. & Victor, J.E., 2009, '*Gladiolus filiformis*', in D. Raimondo, L. von Staden, W. Foden, J.E. Victor, N.A. Helme, R.C. Turner *et al.* (eds.), 'Red list of South African plants 2009', *Strelitzia* 25, p. 146, South African National Biodiversity Institute, Pretoria.
- International Union for Conservation of Nature, 2001, *IUCN red list categories and criteria: Version 3.1*, IUCN Species Survival Commission, Gland, Switzerland.
- Lewis, G.J., Obermeyer, A.A. & Barnard, T.T., 1972, '*Gladiolus*: A revision of the South African species', *Journal of South African Botany Suppl.* 10.
- Partridge, T.C., Dollar, E.S.J., Moolman, J. & Dollar, L.H., 2010, 'The geomorphic provinces of South Africa, Lesotho and Swaziland: A physiographic subdivision for earth and environmental scientists', *Transactions of the Royal Society of South Africa* 65(1), 1–47. <http://dx.doi.org/10.1080/00359191003652033>