



## *Gymnosporia sekhukhuniensis* (Celastraceae), a new species from South Africa

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### Abstract

*Gymnosporia sekhukhuniensis*, a new species from north-eastern South Africa, is described, illustrated, mapped, and compared with closely related species. It belongs to *Gymnosporia* sect. *Buxifoliae*, more specifically Group 1, the members of which are characterized by the capsules being (2)3(4)-valved, rugose or verrucose, and the seeds partially covered by the aril. The new species has a restricted distribution range and is near-endemic to the Sekhukhuneland Centre of Endemism. This biogeographical region rich in restricted-range plants is more or less congruent with surface outcrops of mafic and ultramafic igneous rocks belonging to the Rustenburg Layered Suite of the eastern Bushveld Complex. The range of the new species shows marginal intrusion into the far northern part of the nearby Wolkberg Centre of Endemism, where it is associated with dolomites of the Malmani Subgroup. *Gymnosporia sekhukhuniensis* is a suffrutex mainly associated with rocky outcrops in open savannah. Diagnostic characters include its dwarf habit (up to 1.6 m tall), capsules that are relatively small (5–8 mm long), woody, scaly-rugose, with hard pointed apices, and leaves that are very laxly arranged on the stems, with some often present on the thorns. Also included is a key to the 10 currently accepted species in *G.* sect. *Buxifoliae* Group 1. The taxonomic significance of capsule and seed characters for demarcating sections and species in the genus *Gymnosporia* is emphasized.

**Key words:** endemism, *Gymnosporia* sect. *Buxifoliae*, morphology, sections, Sekhukhuneland, taxonomy, ultramafic soils, Wolkberg

### Introduction

*Gymnosporia* (Wight & Arnott 1834: 159) Hooker in Bentham & Hooker (1862: 359, 365) is an Old World genus comprising over 100 currently accepted species (Jordaan & Van Wyk 2006; Jordaan 2013). Following the reinstatement of the genus *Gymnosporia* and a revision of the southern African members (Jordaan 1995, Jordaan & Van Wyk 1999a), the new species described as *Gymnosporia sekhukhuniensis* in the present contribution, has come to light. It was treated under this name in a still largely unpublished monograph of the genus (Jordaan 2013).

Archer & Jordaan (2006) recognized 26 described species of *Gymnosporia* in the *Flora of Southern Africa* (FSA) region, the latter which covers South Africa, Namibia, Botswana, Eswatini (formerly Swaziland) and Lesotho. With the subsequently publication of *G. hemipterocarpa* Jordaan (2008: 150) and *G. swazica* Jordaan & Van Wyk (2015: 296), there are currently 28 species accepted in the FSA region. The new species is a non-clonal suffrutex with a restricted distribution in the Sekhukhuneland region, north-eastern South Africa, and was brought to our attention by Ernst Schmidt and Pieter Winter. Subsequently the authors visited the area and collected sufficient material to describe the species.

The Sekhukhuneland region has a rich and diverse flora and is recognized as a local centre of plant endemism, namely the Sekhukhuneland Centre (Siebert *et al.* 2001; Van Wyk & Smith 2001). The Sekhukhuneland Centre is located about 200 km north-east of Pretoria in the Limpopo and Mpumalanga Provinces, bordered in the north by the Strydpoort Mountains, in the east by the Steenkampsberg and Great Escarpment, in the west by the Springbok Flats and in the south by the Highveld Escarpment (Van Wyk & Smith 2001).

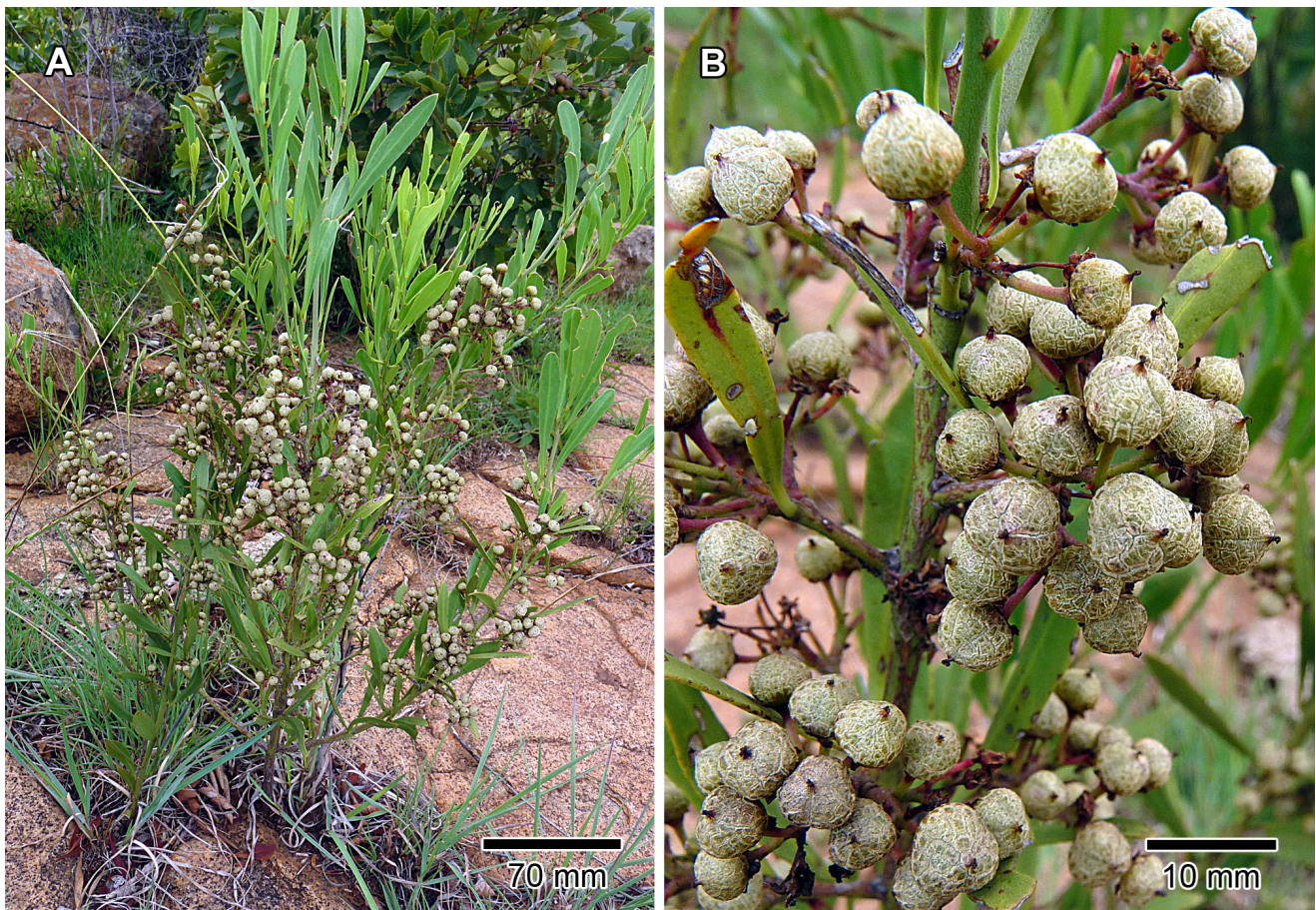
Capsule and seed characters are of considerable taxonomic significance for demarcating sections and species in *Gymnosporia*. The new species belongs to *Gymnosporia* sect. *Buxifoliae* Jordaan in Jordaan & Van Wyk (2006: 519) in having rugose, 3-valved capsules and a pale yellow aril only partially covering the seed. *Gymnosporia* sect.

*Buxifoliae* comprises three informal groups of species complexes. The first group, to which the new species belongs, is characterized by the capsules being rugose or verrucose and usually 3-valved, occasionally 2- or 4-valved. A key to the members of this species complex is provided further on in the present contribution. The second group consists of all the species with smooth capsules, transversely striate when dry, and 2- or 3-valved. The third group is made up of a few species with the capsules ridged or sulcate, smooth or rugose, e.g. *G. devenishii* Jordaan in Jordaan & Van Wyk (2000: 10) and *G. hemipterocarpa*.

## Materials and methods

This contribution emanates from an ongoing project on the taxonomy of the genus *Gymnosporia*. More details on the approach and methodology followed are supplied in Jordaan (2013). Descriptions and observations in the present paper are based on the study of the new species in its natural habitat, combined with field knowledge gained by both authors when studying members of *Gymnosporia* in southern Africa over many years. In addition, herbarium specimens of the new species were examined in the National Herbarium (PRE), South African National Biodiversity Institute, Pretoria and H.G.W.J. Schweickerdt Herbarium (PRU), University of Pretoria, Pretoria. Herbarium codes follow Index Herbariorum (Thiers 2019). Localities are indicated as quarter degree grid squares using the degree reference system of Edwards & Leistner (1971).

The distribution map was compiled from specimen data using ArcView 3.1 software. The original base map is based on the GTOPO30 global digital elevation model. The colours were modified in Global Mapper v6.06. The Conservation assessment follows the standard procedures based on IUCN guidelines (IUCN 2012).



**FIGURE 1.** *Gymnosporia sekhukhuniensis*, on the farm Hoogland 38JT, between Lydenburg (Mashishing) and Roosenekal in Mpumalanga province, South Africa. A. Plant with fruit; in natural habitat, amongst rocks of norite. B. Almost mature fruit. Photographs: W. McClelland.





**FIGURE 2.** *Gymnosporia sekhukhuniensis*. A. Leafy branchlet with fruit. B. Twig with male flowers. C. Female flower. D. Male flower. E. Dehisced capsule with seed. F. Seed, with basal aril. Scale bar = 10 mm (A & B), 1 mm (C, D & F) and 2 mm (E). A from *Winter 2585*, B from *Winter 2932*, C from *Schmidt 845*, D from *Stalmans 695*, E & F from *McMurtry 12408*. Artist: Daleen Roodt.

## Taxonomic treatment

### *Gymnosporia sekhukhuniensis* Jordaan & A.E.van Wyk, *sp. nov.* (Figs. 1 & 2)

Closely related to *Gymnosporia heterophylla* (Ecklon & Zeyher 1834–1835: 120) Loesener (1892: 207), with which it shares being a suffrutex with the stems angular-ribbed and in having capsules with a rugose surface, but from which it differs in the leaves being laxly arranged on the stems (*vs.* very densely and compactly), usually longer than 35 mm (*vs.* usually shorter than 20 mm), and capsules with apices apiculate (*vs.* rounded). Also related to the widespread *G. buxifolia* (Linnaeus 1753: 197) Szyszylowicz (1888: 34), from which it differs in being a suffrutex up to 1.6 m tall (*vs.* usually a shrub or tree more than 2 m tall), with stems angular-ribbed (*vs.* terete) and capsules 5–8 mm long (*vs.* usually less than 5 mm long), with apices apiculate (*vs.* not apiculate).

**Type:**—SOUTH AFRICA. Limpopo: Wolkberg, Bewaarkloof, Farm La Fleur 907KS, 2429BB, 1 February 1998, *P. Winter 2585* (holotype PRE!).

*Gymnosporia* sp. A in Schmidt (2002: 346).

*Gymnosporia* sp. 9 in Jordaan & Van Wyk (2006: 520)

Slender dioecious suffrutex up to 1.6 m tall, usually smaller, multi-stemmed, few-branched, glabrous; branchlets green to reddish brown, angular-ribbed. *Thorns* few, slender, up to 30 mm long, often leafy. *Leaves* alternate or fasciculate, laxly arranged on stems, coriaceous, yellowish green; lamina linear to elliptic-linear, to narrowly oblanceolate, (20–)30–50(–75) × 3–7(–12) mm, apex acute or rounded to emarginate, base narrowly cuneate, margins serrate in distal half, otherwise entire, venation obscure; petiole very short, ± 1 mm long. *Inflorescences* axillary, usually shorter than leaves; peduncles up to 4 mm long; bracts ± 1 mm long, margin fimbriate. *Flowers* few per cyme, creamy white, ± 5 mm in diam.; pedicels up to 5 mm long. *Sepals* ovate, ± 1 mm long, with ciliolate margins. *Petals* oblong, ± 3 mm long, margin uneven. *Disc* a narrow rim, wavy, 5-lobed. *Male flowers*: filaments ± 2 mm long; pistillode short; style unbranched, ± 0.5 mm long. *Female flowers*: staminodes shorter than stamens in male flowers; ovary 3-locular; style 3-branched, ± 1.5 mm long. *Capsules* globose, 5–8 mm long, 3-valved, rugose, coriaceous, with apices apiculate, pale brownish. *Seeds* golden brown; aril pale yellow, partially covering the seed.

**Phenology:**—Flowers were recorded mainly from September to October and fruits from December to May.

**Etymology:**—The specific epithet is derived from Sekhukhuneland, the region to which the species is largely confined.

**Distribution:**—Occurs along the north-eastern Great (Drakensberg) Escarpment of the Limpopo and Mpumalanga Provinces of South Africa and is considered near-endemic to the Sekhukhuneland Centre of Endemism, with marginal intrusion into the far northern adjoining part of the Wolkberg Centre of Endemism (Van Wyk & Smith 2001) (Fig. 3).

**Habitat:**—The core area of the Sekhukhuneland Centre of Endemism is more or less congruent with surface outcrops of the Rustenburg Layered Suite, one of the stratigraphic units of the eastern Bushveld Complex (Cawthorn *et al.* 2006). This igneous complex is characterised by mafic and ultramafic rocks, the latter that gives rise to soils that are often rich in heavy metals. The mountains and rocky ridges mainly consists of rocks in the form of norite, pyroxenite and anorthosite (Siebert & Van Wyk 2001). As is the case with many plant species largely confined to the Sekhukhuneland Centre, *Gymnosporia sekhukhuniensis* also occurs on the Malmani Subgroup dolomites (Eriksson *et al.* 2006) of the nearby Wolkberg Centre, most probably because of similarly high levels of calcium and magnesium in soils derived from dolomite and some rocks of the Bushveld Complex. *Gymnosporia sekhukhuniensis* grows mainly on rocky norite or dolomite outcrops and hillsides, amongst others in bushveld (savannah) that has been classified by Van Rooyen & Bredenkamp (1996) as Mixed Bushveld, or in ecotonal areas between bushveld and Highveld grassland. More specific vegetation types with which it is associated include open Sekhukhune Mountain Bushveld (mapping unit: SVcb 28) and Sekhukhune Plains Bushveld (mapping unit SVcb 27) (Mucina & Rutherford 2006). Populations are usually small and localised.

**Conservation status:**—*Gymnosporia sekhukhuniensis* is known from a few statutory conservation areas, e.g. the Wolkberg and Lekgalameetse Nature Reserves, where it is protected, but otherwise occurs mostly outside protected areas where human population pressure, subsistence and commercial farming, extensive mining for heavy metals as well as dimension stone, and invasion of alien plant species are the most destructive (Siebert *et al.* 2001). Hence this species is categorised as ‘Vulnerable’ according to the IUCN Red List categories and criteria (IUCN 2012).

**Additional specimens examined (paratypes):**—SOUTH AFRICA. **Limpopo:** Polokwane District, Wolkberg Nature Reserve, Farm Morgendaal 216KS (2429BB), 9 April 1990, *Balkwill et al. 5571* (PRE); Bewaarkloof, Strydpoort range, Farm La Fleur 907KS, on road to Serula [Serala] Forest Station (2429BB), 3 October 1998, *Winter 2932* (PRE); Lekgalameetse Nature Reserve, Farm Cyprus (2430AB), 18 September 1985, *Stalmans 695* (PRE); Leolo

Mountains, Farm Schoonoord (2430CA), 11 December 2000, *Jordaan 3805* (PRE), 14 July 1999, *Van Wyk & Siebert 996* (PRU). Steelpoort (2430CA), 25 October 1997, *Schmidt 843* (PRE). **Mpumalanga:** W of Lydenburg District, S of Maartenshoop, summit of Naauwpoort Pass (2430CC), 16 March 2005, *McMurtry 12408* (PRE); Lydenburg District, Farm Moreesburg (2430CC), 1 December 1997, *Van Wyk 13052* (PRE, PRU); Burgersfort District, Thorncliffe Chrome Mine (2430CC), 9 May 1997, *Van Wyk & Siebert 13000* (PRU); Lydenburg District, Farm Vygenboom (2530AA), 2 February 1997, *Van Wyk 13066* (PRE, PRU); Roosenekal, Mapoch's caves (2529BB), 10 January 1998, *Siebert 458* (PRU).

**Common names:**—The proposed common names for this plant are Sekhukhune spikethorn, *sekhukhunependoring* (Afrikaans).

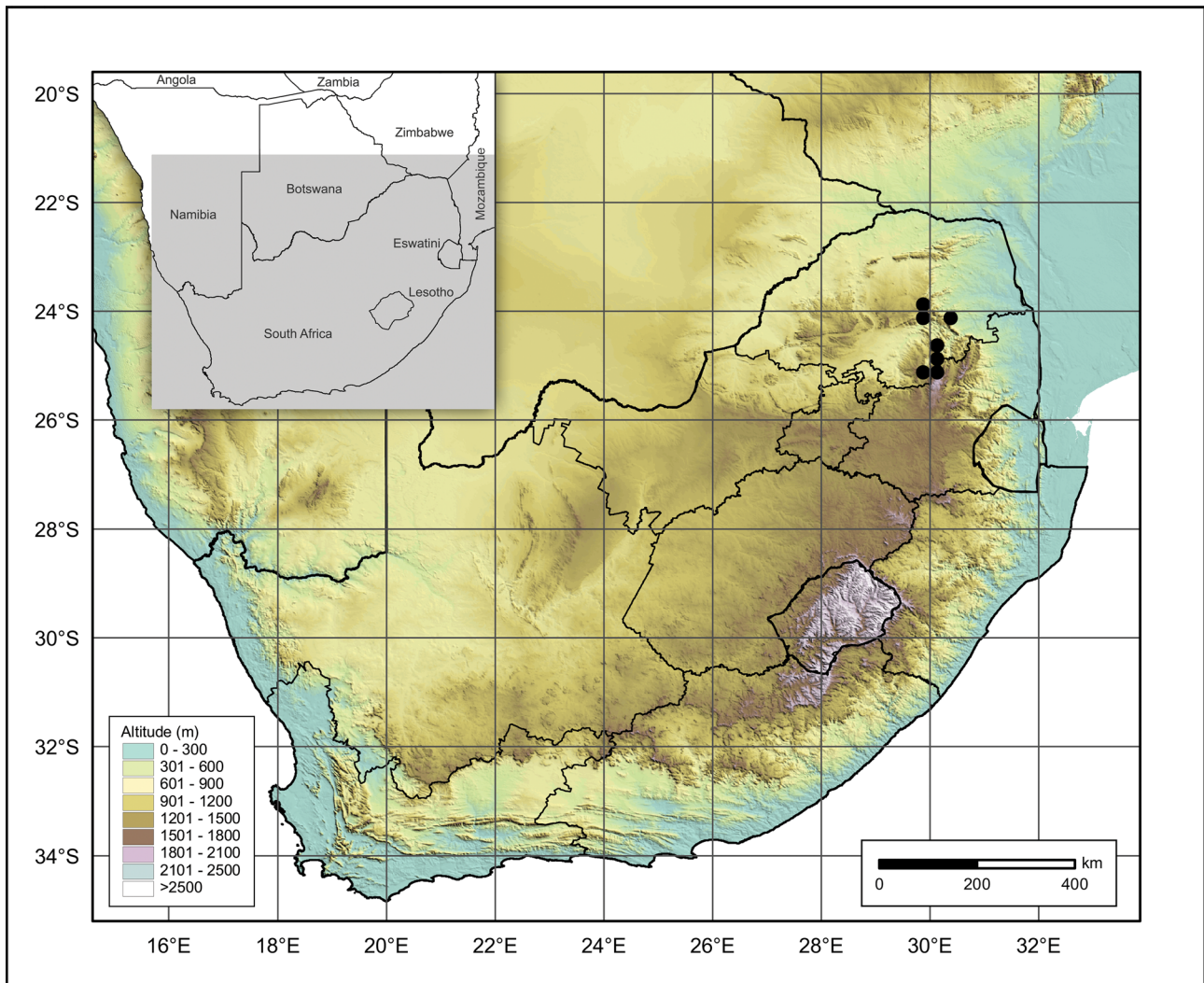
**Notes:**—*Gymnosporia sekhukhuniensis* belongs to *G.* section *Buxifoliae* (Jordaan & Van Wyk 2006) Group 1, for which an identification key to the members is supplied below. It has the same type of capsules and seed as in *G. buxifolia*, *G. elliptica* (Thunberg 1823: 218) Schonland (1919: 73), *G. grandifolia* (Davison 1927: 316) Jordaan in Schmidt *et al.* (2002: 676), *G. heterophylla* and *G. macrocarpa* Jordaan in Jordaan & Van Wyk (2000: 12), namely, brown or reddish brown and rugose, dehiscent into three parts and with the yellow aril partially covering the seed. *Gymnosporia buxifolia* is mainly a multi-stemmed shrub or tree and its capsules are relatively small, 2–5 mm long, whereas *G. sekhukhuniensis* is a dwarf shrub and has capsules longer than 5 mm. The new species differs from *G. heterophylla* in its leaves which are few and very laxly arranged on the stems, usually longer than 30 mm and often also present on the thorns. *Gymnosporia heterophylla* is a densely, stiffly branched shrub, often branched in the upper half, with dense foliage, the leaves usually less than 30 mm long, usually with the leaves larger proximally and gradually becoming smaller distally. *Gymnosporia macrocarpa*, confined to central KwaZulu-Natal (notably the Thugela River Valley), also has rugose capsules, but these are relatively large (12–15 mm long), thick and woody, sometimes dehiscent into four parts. *Gymnosporia elliptica* is a geoxylic suffrutex confined to coastal grassy fynbos in the Eastern Cape. *Gymnosporia grandifolia* is a forest tree with thick, woody capsules, usually longer than 8 mm, occurring from the Soutpansberg range in Limpopo, south-eastwards through Mpumalanga, Eswatini and KwaZulu-Natal to as far south as East London in the Eastern Cape.

#### Key to the species of *Gymnosporia* sect. *Buxifoliae* (Group 1: species with rugose capsules)

For a key to the sections of *Gymnosporia*, see Jordaan & Van Wyk (2006). Following the description of *G. sekhukhuniensis*, 10 species are recognized in Group 1 of *G.* sect. *Buxifoliae*. Of these the majority, eight species, are confined to southern Africa. These are *G. arenicola* Jordaan in Jordaan & Van Wyk (1999b: 315), *G. buxifolia*, *G. elliptica*, *G. grandifolia*, *G. heterophylla*, *G. macrocarpa*, *G. sekhukhuniensis* and *G. woodii* Szyszylowicz (1888: 35). The remaining two species are from East Africa, namely *G. masindei* (Gereau 2001: 43) Jordaan in Jordaan & Van Wyk (2006: 520) and *G. nguruensis* (Robson & Sebsebe 1987: 426) Jordaan in Jordaan & Van Wyk (2006: 520)

1. Suffrutices or dwarf shrubs, less than 2 m high .....2
- Shrubs, usually more than 2 m high, or trees .....5
2. Mature leaves less than 14 mm wide .....3
- Mature leaves usually more than 15 mm wide; KwaZulu-Natal ..... *G. woodii*
3. Leaves not prominently dimorphic on stems, venation obscure .....4
- Leaves larger proximally on stems, gradually becoming smaller towards stem apices, secondary reticulate venation prominently raised and conspicuous on both sides; leaf apices often with a mucro ..... *G. heterophylla*
4. Leaves very laxly arranged on stems; capsules with prominent sharp apices; Sekhukhuneland part of Limpopo and Mpumalanga. .... *G. sekhukhuniensis*
- Leaves compact and densely arranged on stems; capsules without sharp points; Eastern Cape ..... *G. elliptica*
5. Capsules thick and woody, longer than 7 mm, 2–4-valved .....6
- Capsules coriaceous, shorter than 7 mm, nearly always 3-valved .....7
6. Leaves usually longer than 65 mm; Tanzania ..... *G. nguruensis*
- Leaves usually shorter than 60 mm; Mozambique, southern Africa .....8
7. Leaf margin indurate, revolute ..... *G. arenicola*
- Leaf margin flat .....9
8. Leaf midrib prominently raised on both sides and conspicuously yellow when dry; capsules 7–10 mm long; Eastern Cape, KwaZulu-Natal, Mpumalanga, Eswatini, Limpopo ..... *G. grandifolia*
- Leaf midrib not prominently raised; capsules 12–15 mm long; Midlands of KwaZulu-Natal (mainly Thugela Valley) ..... *G. macrocarpa*
9. Branchlets terete; leaf lamina variable, obovate, lanceolate-obovate, cuneate-obovate or obovate-rhomboid, 25–45(–80) × (8–)10–20(–25) mm; FSA region, Zimbabwe ..... *G. buxifolia*
- Branchlets angular; leaf lamina mostly oblanceolate, 10–28 × 2–8 mm; Kenya, Tanzania ..... *G. masindei*





**FIGURE 3.** Topographical map showing the known distribution (black dots) of *Gymnosporia sekhukhuniensis* based on herbarium collections in PRE and PRU. The insert shows a map of southern Africa with names of countries; the grey rectangle indicates the area depicted by the topographical map.

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