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A new species of *Ozoroa* (Anacardiaceae: Anacardioideae) from Maputaland, South Africa

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Abstract

Ozoroa bhangazica, a clonal, fire-adapted geoxylic suffrutex, is formally described as a new species with a highly restricted distribution in the Maputaland Centre of Endemism in KwaZulu-Natal Province, South Africa. It is confined to Maputaland Wooded Grassland on Quaternary coastal sands, a vegetation type notable for its rich diversity of geoxylic suffrutices. The two known populations are included in the iSimangaliso Wetland Park, a World Heritage Site. In southern Africa, *Ozoroa* species are divided into two groups based on leaf and pollen characters; *O. bhangazica* belongs to Group A and is unique among KwaZulu-Natal species for its geoxylic growth form. The genus shows significant infraspecific vegetative variation, with *O. bhangazica* displaying distinct variation in leaf size and shape between new shoots after fire and regrowth that has persisted through one or more fire-free seasons. Morphologically, the new species resembles *O. barbertonensis*, another geoxylic suffrutex, which is a geographically isolated serpentine endemic confined to the Barberton Centre of Endemism about 250 km from where *O. bhangazica* occurs. Both share the characteristic of linear to narrowly oblong leaves following fire. However, *O. bhangazica* can be distinguished by its longer, broader leaves, which are mostly glabrous on the upper surface with flat (non-revolute) margins, a longer petiole, and larger mature drupes. A provisional conservation status of Near Threatened (NT) is recommended under IUCN Red List criteria.

Key words: classification, endemism, geofrutex, geoxyle, geoxylic suffrutex, grassland, iSimangaliso Wetland Park, KwaZulu-Natal, Maputaland Centre of Endemism, Maputaland-Pondoland-Albany Hotspot, pollen, taxonomy, underground trees

Introduction

Ozoroa Raffeneau-Delile (1843: 91) belongs to the subfamily Anacardioideae within the pan-tropical family Anacardiaceae (Pell *et al.* 2011, Christenhusz *et al.* 2018). The genus comprises approximately 45 accepted species distributed across sub-Saharan Africa and the south-western Arabian Peninsula (POWO 2025, WFO 2025). Of these, 12 species are currently recognised in South Africa (South African National Biodiversity Institute 2025). Taxonomically, *Ozoroa* is a difficult genus, as species are primarily distinguished by vegetative characters, which tend to exhibit considerable morphological variation, complicating accurate classification and identification.

Within southern Africa, the genus most closely related to *Ozoroa* has traditionally been considered to be *Heeria* Meisner (1837: 55), a monotypic genus restricted to South Africa's Western Cape Province (South African National Biodiversity Institute 2025). Molecular analyses including only members of *Ozoroa* Group A (see below) have provided evidence for either a close (Pell 2004) or sister-group (Joyce *et al.* 2023) relationship between these two taxa. In the past, several species now placed in *Ozoroa* were classified within *Heeria*. However, Fernandes & Fernandes (1965), based on differences in floral, fruit, and pollen characters, upheld the distinction between the two genera. Subsequent studies on fruit and seed structure (Von Teichman 1993, Von Teichman & Van Wyk 1993, 1996) provided further support for maintaining their separation. This taxonomic treatment has since been widely accepted (e.g. De Winter 1974, Archer 2000, Coates Palgrave 2002, Schmidt *et al.* 2002, Boon 2010, Pell *et al.* 2011, Van Wyk & Van Wyk 2013, POWO 2025).

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As noted by Von Teichman & Van Wyk (1996), the genus *Ozoroa* in southern Africa consists of a heterogeneous collection of species that can be provisionally divided into two morphologically distinct groups, referred to here as Group A and Group B. The taxonomic distinction between these two groups warrants further investigation, particularly through molecular studies, as it is possible that they represent two separate supraspecific taxa.

Group A is characterised by species with the leaves predominantly opposite or whorled, occasionally alternate or subverticillate (Schmidt *et al.* 2002, Boon 2010, Van Wyk & Van Wyk 2013). The pollen grains in this group exhibit a punctate exine sculpture. These species are primarily distributed in savannah regions with relatively high summer rainfall. Based on current knowledge, most southern African species of *Ozoroa* (see next paragraph), along with all those occurring further north in Africa, are included in this group. This includes *Ozoroa insignis* Raffeneau-Delile (1843: 91), the type species of the genus.

In contrast, species in Group B typically have the leaves predominantly alternate or clustered at the tips of branchlets (Hufkie 1996, Van Wyk & Van Wyk 2013, Mannheimer & Curtis 2018). Their pollen grains feature a striate exine sculpture. This group comprises only five species: *O. concolor* (Sonder 1860: 521) De Winter (1974: 277), *O. crassinervia* (Engler 1888: 37) Fernandes & Fernandes (1965: 152), *O. dispar* (Presl 1845: 472) Fernandes & Fernandes (1965: 153), *O. namaensis* (Schinz & Dinter 1903: 823) Fernandes (1966: 41), and *O. namaquensis* (Sprague 1913: 179) Von Teichman & Van Wyk (1994: 183). These species are restricted to the arid, semi-desert regions of South Africa's Northern Cape Province and Namibia, where rainfall occurs mainly in winter, although at least two species extend into summer rainfall areas.

Members of *Ozoroa* Group A, as considered in this study, are readily recognisable in the field by their simple, opposite or whorled (occasionally alternate or subverticillate, especially in active new growth) leaves, which are typically discolorous and display numerous, more or less parallel veins (with craspedodromous venation), along with the presence of cloudy or milky latex (Van Wyk & Van Wyk 2013). However, distinguishing individuals at the species level can be difficult due to considerable infraspecific variation. Notably, the morphology of leaves on young plants or coppice shoots often differs substantially from those found on mature plants (Von Teichman & Van Wyk 1993, Van Wyk & Van Wyk 2013).

Most *Ozoroa* Group A species in the *Flora of southern Africa* [FSA] region, which includes South Africa, Namibia, Botswana, Eswatini, and Lesotho, are shrubs or small trees (Coates Palgrave 2002, Van Wyk & Van Wyk 2013). However, three described species—namely *O. albicans* Fernandes & Fernandes (1965: 247) from Limpopo and, marginally, Mpumalanga Provinces, South Africa; *O. barbertonensis* Retief (1990: 219) from Mpumalanga Province (Retief 1990, Schmidt *et al*. 2002); and *O. schinzii* (Engler 1898: 500) Fernandes & Fernandes (1965: 178) from Namibia, and marginally Botswana (Setshogo 2005, Klaassen & Kwembeya 2013, WFO 2025)—exhibit a distinctive dwarfed clonal growth form. These species are classified as geoxylic suffrutices (White 1976), often referred to more simply as geoxyles, geofrutices, or geosuffs.

Simon & Pennington (2012) defines geoxyles as plants possessing '...woody xylopodia underground but only limited and often short-lived aerial shoots'. White (1976) further restricts the use of this term to species closely related to large trees and lianes within genera otherwise composed of large woody plants, such as *Ozoroa*. This distinction is important, as it separates geoxylic suffrutices from perennial clonal plants found in predominantly herbaceous genera.

White (1976) also referred to plants exhibiting the geoxyle growth form as 'underground trees' and used the term 'underground forests' for vegetation communities where these largely clonal plants are dominant—a concept that has since been widely adopted in ecological literature (e.g. Courtenay *et al.* 2024, and references therein). The most widespread occurrence of geoxyles in Africa is on the high rainfall Kalahari sands of the Upper Zambezi Basin and surrounding areas, centred on central and eastern Angola, and adjacent northwestern Zambia (White 1976, Goyder *et al.* 2023). Many geoxyles are endemic to this region.

A fourth geoxylic suffrutex species of *Ozoroa* Group A, previously undescribed, occurs in coastal grassland within the iSimangaliso Wetland Park in South Africa's KwaZulu-Natal [KZN] Province. This area forms part of the Maputaland Centre of Endemism, a biogeographical region noted for its high concentration of plant and animal species with restricted distributions (Van Wyk 1994, 1996, Van Wyk & Smith 2001). The Maputaland Centre also harbours a high diversity of geoxyles, including several endemics (Matthews *et al.* 1999, Thornhill & Felton 2000, Van Wyk & Smith 2001). Although this *Ozoroa* has not yet been formally described, it has been known from the literature for over 25 years (Scott-Shaw 1999). It was also referred to and illustrated in the description of the Maputaland Wooded Grassland vegetation type (Mucina & Rutherford 2006) and subsequently mentioned in Boon (2010).

The earliest known herbarium specimens of this previously undescribed dwarf *Ozoroa* were collected in July 1925 (*Boocock s.n.* and *Miller & Boocock s.n.*, both recorded as Herb. PRF5715 and now incorporated in Herb. PRE). Older

collections of the taxon have mostly been misidentified as *O. paniculosa* (Sonder 1860: 522) Fernandes & Fernandes (1965: 167), and occasionally as *O. engleri* Fernandes & Fernandes (1965: 153) or *O. insignis*. Since around 1990, however, new collections have generally been recognised as representing a distinct, undescribed species of *Ozoroa*. The purpose of the present paper is to formally describe and name this species as *Ozoroa bhangazica*.

Materials and methods

Descriptions and observations in the present paper are based on extensive field work conducted by both authors over many years in the natural habitat of *Ozoroa* species in southern Africa. This was supplemented by study of relevant literature and herbarium collections. One of us (RGCB) visited coastal Maputaland in the iSimangaliso Wetland Park to conduct fieldwork and morphological observations on the new geofrutex species of *Ozoroa* and other members of the genus.

The following herbaria were visited to examine specimens: CPF (now incorporated in NU), NH, NU, PRE, PRU, and UDW (now incorporated in NU). The Kew Data Portal was consulted for possible collections of the new species in Herb. K (http://www.data.kew.org; accessed 27 June 2025). Herbarium codes follow Thiers (2025).

In the section "Additional specimens examined", locality citations were reproduced as per the specimen labels. If available, barcodes for specimens are supplied. In some cases, the spelling of the locality name was corrected to match those used by the iSimangaliso Wetland Park Authority and the correction is included in square brackets (iSimangaliso Wetland Park 2025). Coordinates are supplied, but only if recorded by collectors. Specimens are arranged according to the Degree Reference System proposed by Edwards & Leistner (1971). The grid references are supplied between brackets after each locality cited. Collections are ordered from north to south according to one-degree squares, with records from the same one-degree square in quarter-degree square alphabetical order, and records from the same quarter-degree square arranged from oldest to newest. Where quarter-degree references were not available on specimen labels, they have been supplied by us and are shown in square brackets. Some coordinates and quarter-degree grid references were corrected and the corrections are included in square brackets following the reference on the collectors' labels. Question marks have been used where it was not possible to determine the locality accurately from the labels.

The distribution map was compiled from specimen data using ArcGIS software (ArcGIS 10.1, 2012; ESRI, Redlands, CA, USA) and the centroid grid values of the quarter-degree grid system derived from the localities provided. The original base map is based on the GTOPO30 global digital elevation model, and colours were modified in Global Mapper v.6.06 (Global Mapper Software LLC 2004–2005).

A preliminary conservation assessment was conducted using the standard procedures based on IUCN guidelines (IUCN 2012, IUCN Standards and Petitions Committee 2024). GeoCAT (Bachman *et al.* 2011) was used to estimate Extent of Occurrence (EOO) and Area of Occupancy (AOO) using the 2 km cell width recommended by the IUCN Standards and Petitions Committee (2024).

Taxonomic treatment

Ozoroa bhangazica R.G.C.Boon & A.E.van Wyk, *sp. nov.* (Figs 1–4)

Diagnosis:—A member of *Ozoroa* Group A; distinguished from all other species of *Ozoroa* in KZN Province, South Africa, by being a clonal geoxylic suffrutex not exceeding 1.5 m in height (*vs.* non-clonal shrubs or trees >2 m tall). Morphologically resembling *O. barbertonensis* in also being a geoxylic suffrutex with linear to narrowly oblong leaves on new growth following a fire, but differing as follows: lamina of post-fire leaves 80–110(–130) mm long [*vs.* shorter, (23–)55–80(–90) mm], (6–)9–18 mm wide [*vs.* narrower, (2–)4–7(–8.5) mm], adaxially glabrous except for midrib and secondary veins (*vs.* ca. uniformly hairy), with margin plane (*vs.* revolute); petiole 5–18 mm long (*vs*. shorter, 1.5–3.0 mm); mature drupe when dry 10 × 7 mm (*vs.* smaller, 4.5–5.0 × 6.0–6.5 mm); confined to Maputaland Centre of Endemism where it grows on nutrient-poor Quaternary coastal sands (*vs.* a serpentine endemic confined to Barberton Centre of Endemism).

Type:—SOUTH AFRICA. KwaZulu-Natal: Sodwana State Forest, Chief's Kraal, (2732DA), 12 September 1985, *Gordon 235* (holotype NH100853!; isotype CPF0005274!).

"*Ozoroa sp. nov.*" in Scott-Shaw (1999: 9); Mucina & Rutherford (2006: 577–578); "*Ozoroa sp.*" in Boon (2010: 262).

Illustrations:—Scott-Shaw (1999: 9, *Ozoroa sp. nov.*, line drawing, ramet showing leaves and mature fruit); Mucina & Rutherford (2006: 577, *Ozoroa sp. nov.*, photograph, plant in habitat); Boon (2010: 263, *Ozoroa sp.*, photograph bottom far-right, shoot with mature fruit).

Dioecious, clonal, pyrogenic geoxylic suffrutex, with few to ca. 80 erect or ascending simple, slender, sub-woody, cylindrical stems (ramets) sprouting from large subterranean lignotuber or extensive system of spreading woody axes (stems/roots), usually 250–500(–800) mm tall, but woody, branched and up to 1.0(–1.5) m tall when long unburnt; individual plants/clones mostly 1–2 m in diam., clones sometimes reaching ca. 11 m in diam.; latex milky; indumentum of young parts dense, with short, <0.5 mm long, white, eglandular, appressed, antrorse, unicellular hairs, becoming glabrescent to glabrous on older parts; newly sprouting ramets following a fire appear silvery-white (due to reflective indumentum on abaxial leaf surface) from a distance. *Bark* on unburnt plants and older stems, smooth, grey to grey-brown, lenticellate; lenticels plane to raised and conspicuous, pale grey-brown to red-brown. New stems fawn to olive-green, young parts with indumentum partially obscuring lenticels. *Stipules* absent. *Leaves on new growth following fire (or other disturbance?)* (Figs 2B & 3A) irregularly spirally arranged (appearing almost three-whorled), simple, erect, spreading later, linear, narrowly elliptic or narrowly oblong, ca. 80–110(–130) × (6–)9–18 mm when mature, base broadly tapered, apex obtuse or broadly acute (to acute), with a slender mucro 0.5–2.0 mm long; margin plane, slightly thickened, yellowish, entire, may appear crenulate when dry; adaxial surface glabrous except for the midrib and secondary veins, abaxially with dense silvery-white indumentum (Fig. 2B) of short, appressed, white hairs, principal lateral veins less hairy and appearing darker than rest of abaxial surface, chartaceous when young, becoming coriaceous with faintly velvety texture abaxially, discolorous on account of indumentum, glossy, mid- to dark green adaxially, becoming yellowish green with age, bluish green to cinereous below when young, midrib yellowish below; venation pinnate, craspedodromous, midrib slightly sunken on adaxial surface, strongly raised on abaxial surface, secondary (principal lateral) veins parallel, ca. 80º to midrib, straight, unbranched, or once- or twice-forked near margin, ca. 33–50 pairs, secondary veins conspicuous below, impressed (slightly raised when dry), tertiary veins reticulate, reticulation obscure and slightly raised. *Petiole* proximally terete, distally shallowly canaliculate, 5–10 mm long, densely hairy. *Leaves on plants not burnt for >1–several years* (Figs 1D & 3B) elliptic, 45–95 × 20–26 mm, apex obtuse, rounded or emarginate, base broadly acute, principal lateral veins ca. 24–26 pairs. *Petiole* 8–15 mm long. *Inflorescences* axillary in upper leaf axils or terminal, paniculate, to ca. 55 mm long, with occasional small leaf in branch axils, axes terete, densely hairy. *Flowers* unisexual, regular, 5-merous, subtended by one or more caducous bracts ca. 1.5–2.0 × 0.25 mm; pedicel usually 1–2 mm long, articulated near apex. *Male flowers* with s*epals* free, broadly ovate-triangular, ca. 1.5–1.75 × 1.0 mm, off-white, apex acute, densely hairy abaxially; *petals* free, oblong, ca. 2.50–3.25 × 1.0–1.5 mm, white or pale cream, apex obtuse or rounded, revolute and slightly reflexed at apex, hairy abaxially but less so than sepals; disc annular with wavy margin; stamens 5, filaments 0.50–0.75 mm long, anthers 0.75–1.00 × 0.5 mm; gynoecium absent or vestigial. *Female flowers* with sepals, petals and disc as in male flowers; staminodes 5; filaments ca. 1 mm long, antherodes ca. 0.5 × 0.25 mm; ovary globose but distinctly axially flattened, ca. 1.5 mm in diam., ca. 0.75 mm high, 1-locular with single laterally attached ovule, styles 3, united at very base, stigmas somewhat capitate. *Fruit* a fleshy drupe, transversely ellipsoid, younger and nearly mature ones slightly laterally compressed, shiny green with scattered sunken spots, each containing modified stoma, distinctly compressed with age, ca. 10 × 7 × 3 mm when dry, green to purplish red-spotted or -tinged when young, glabrous, glossy black and irregularly rugose when mature.

Phenology:—Flowering is from September–February(–May), with a peak in November. Timing is probably influenced by the time elapsed since the last grassland fire. Mature fruit has been observed between November and June. Fruit probably takes about six months to develop after flowering. Collections of plants with mature fruit in spring and early summer were probably taken in grasslands that did not burn in the preceding dry season.

Etymology:—The specific epithet "*bhangazica*" refers to the fact that the species is currently known only from the vicinity of Lake Bhangazi North and Lake Bhangazi South in the iSimangaliso Wetland Park World Heritage Site in KZN Province, South Africa.

The name of the lakes derives from the Zulu word *umbhangazi*, which refers to various quick-growing trees—Zulu names of geographical features are often named for the dominant vegetation there (A. Koopman, pers. comm.).

Distribution:—*Ozoroa bhangazica* is known only from KZN Province in South Africa (Fig. 4); more specifically the southern part of the Maputaland Centre of Endemism, an area rich in restricted-range plants and animals (Van Wyk 1996, Van Wyk & Smith 2001). The Maputaland Centre is at the southern end of the tropics in Africa (Van Wyk 1996) and at the northern end of the Maputaland-Pondoland-Albany Hotspot, one of 36 global biodiversity hotspots (Steenkamp *et al.* 2004).

Within the Maputaland Centre, *O. bhangazica* occurs in two separate, small areas in the iSimangaliso Wetland Park, which is a UNESCO World Heritage Site (Nomination 914). One area, referred to as the Eastern Shores, stretches from the town of St Lucia in the south to Cape Vidal and Lake Bhangazi South in the north. The second area is about 60 km north of the first and lies between Lake Bhangazi North and Sodwana Bay, which is about 10 km north of the Lake.

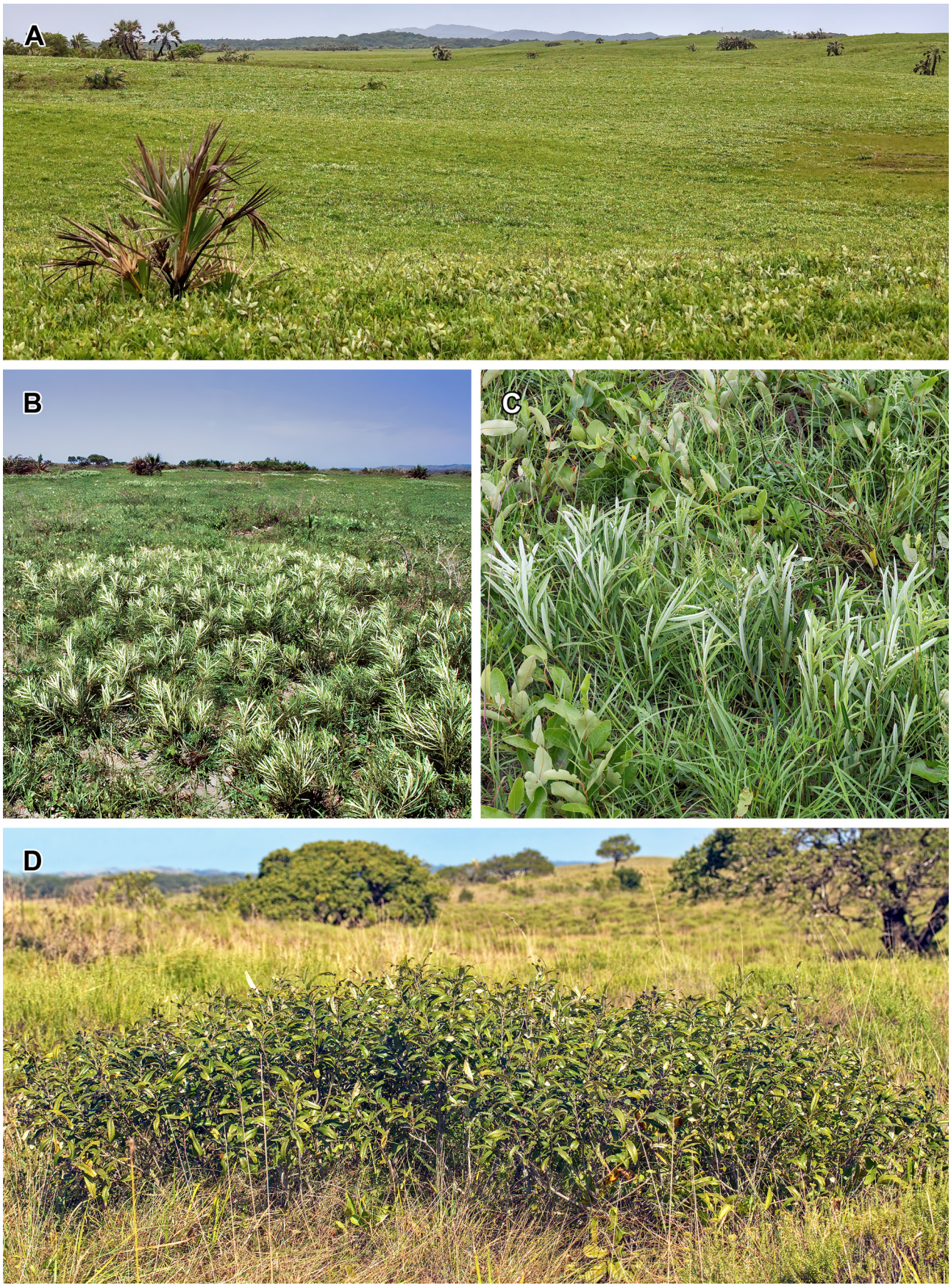

FIGURE 1. *Ozoroa bhangazica*: habitat and habit. **A.** Maputaland Wooded Grassland on Quaternary coastal dunes, showing a mix of grasses and broad-leaved geoxylic suffrutices. **B.** Clone with multiple ramets emerging shortly after fire; note the silvery-white underside of leaves. **C.** Post-fire ramets (ca. 250 mm high) with developing inflorescences. **D.** Mature growth (ca. 1 m high) unburned for one or more seasons, bearing mature fruit and relatively broad leaves. Photographs by R.G.C. Boon (A, C & D) and W.S. Matthews (B).

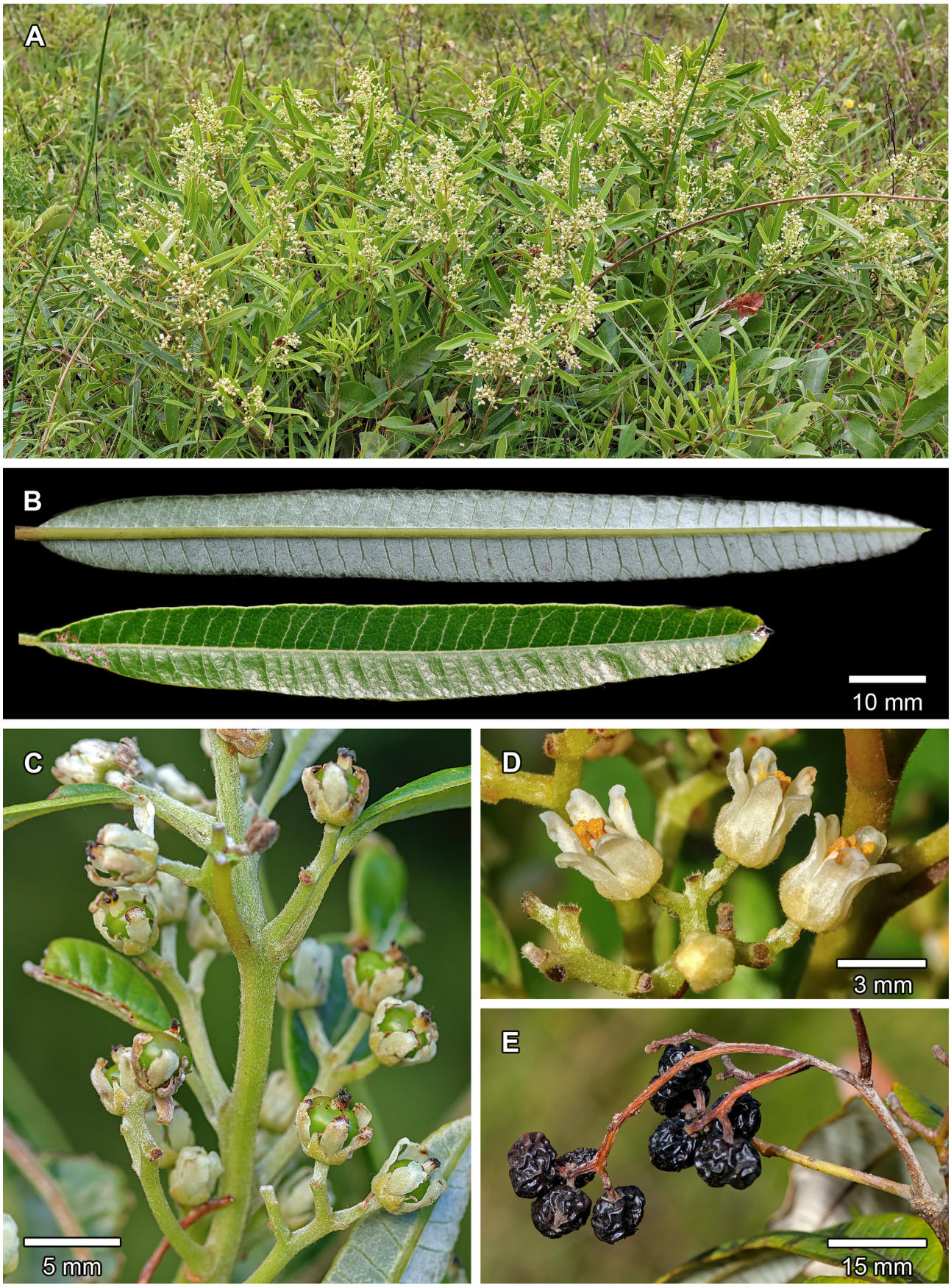

FIGURE 2. *Ozoroa bhangazica*: leaf, flower and fruit morphology. **A.** Plant (ca. 600 mm high) in flower. **B.** Leaves from a recently sprouted post-fire plant, showing craspedodromous venation; blade with silvery-white abaxial surface, green and mostly hairless adaxial surface, except for hairs along the midrib and main veins. **C.** Older female flowers with early fruit development. **D.** Male flowers. **E.** Mature fruit. Photographs by R.G.C. Boon.

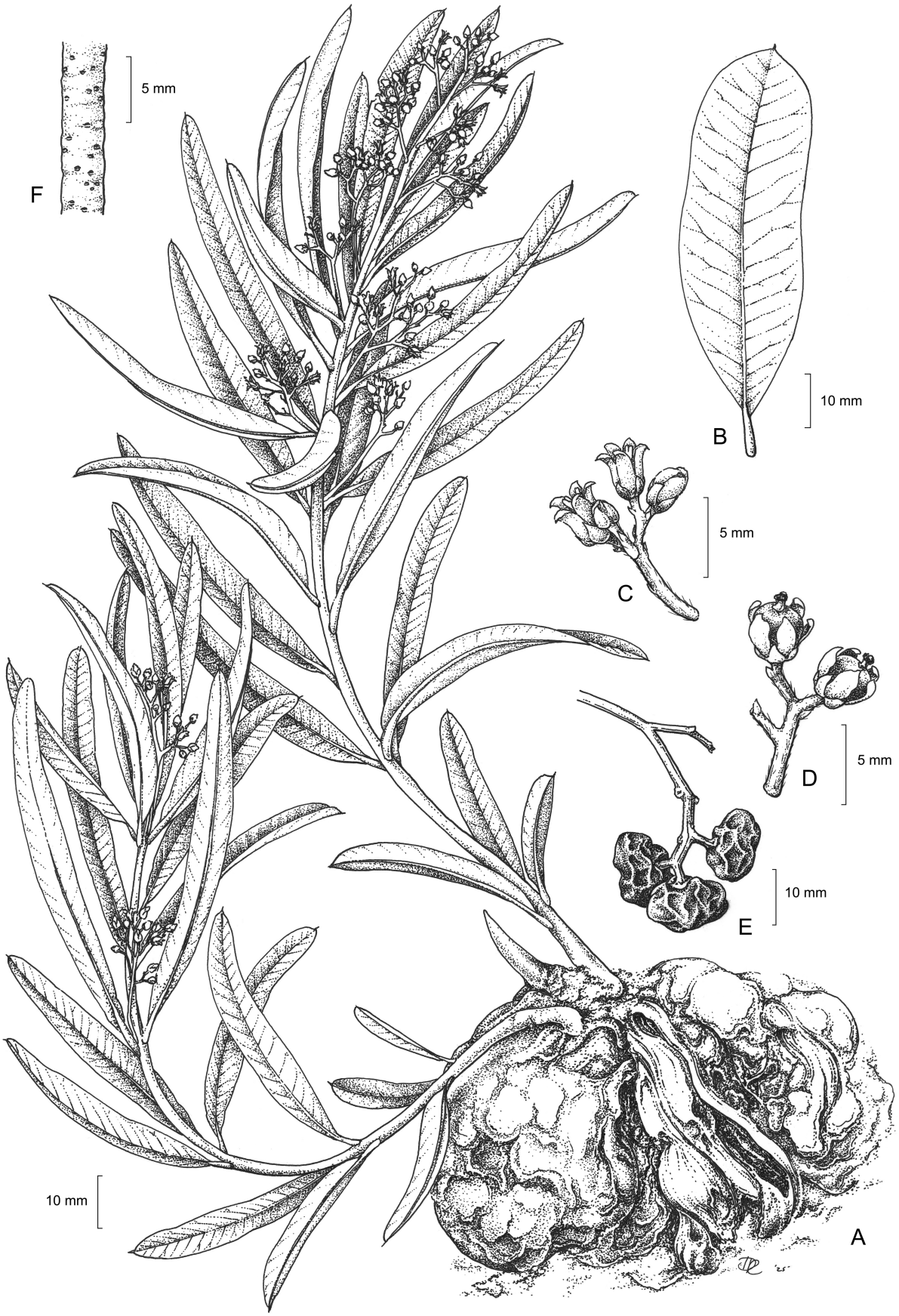

FIGURE 3. *Ozoroa bhangazica*. **A.** Two flowering shoots (ramets) sprouting from a partially exposed lignotuber after fire. **B.** Relatively broad leaf from regrowth that has persisted through one or more fire-free seasons. **C.** Male flowers. **D.** Female flowers. **E.** Mature fruit. **F.** Stem section from regrowth that has persisted through one or more fire-free seasons showing bark with lenticels. Artist: Daleen Roodt.

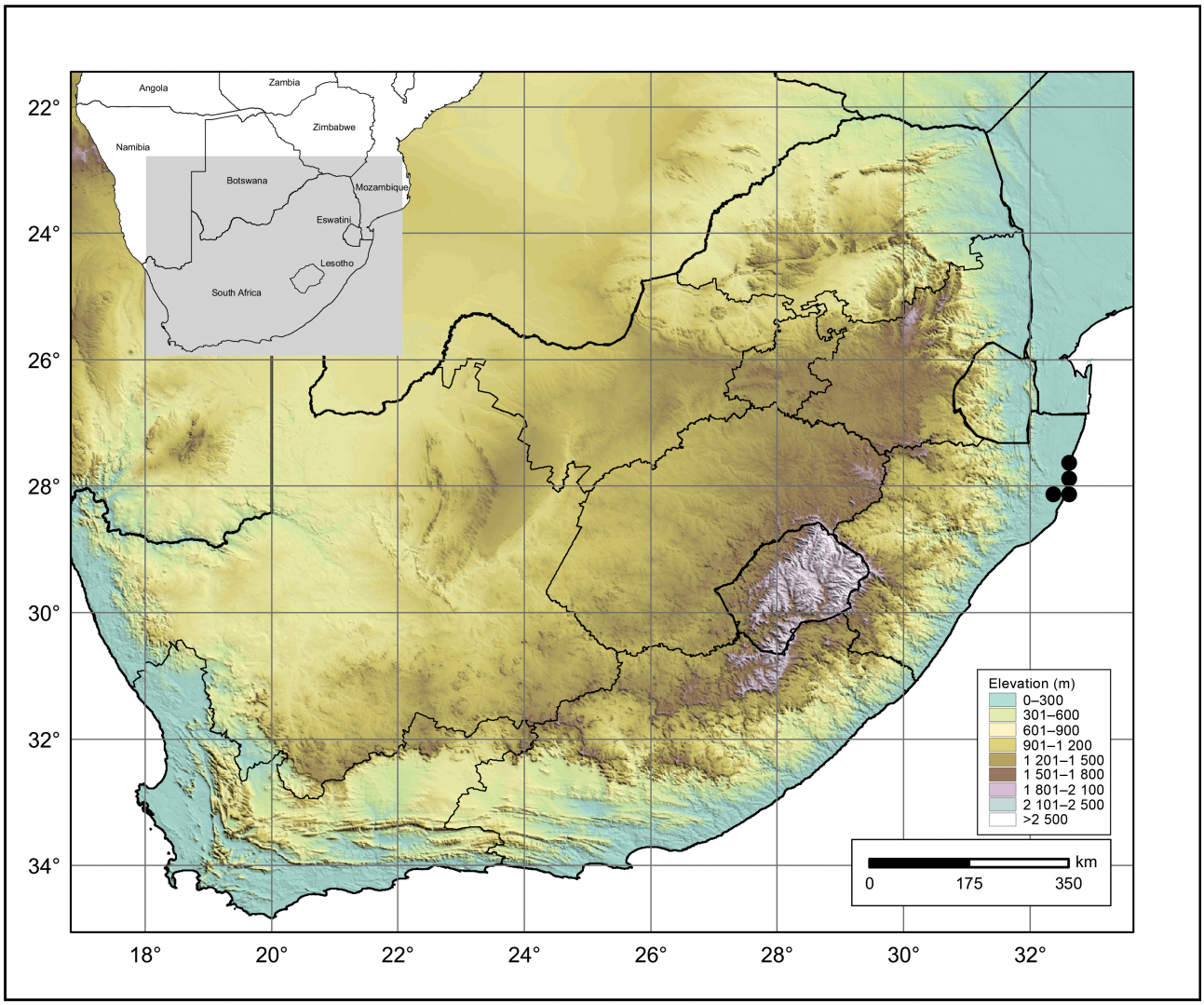

FIGURE 4. Topographical map showing the known distribution of *Ozoroa bhangazica* (black dots). Map based on herbarium collections in CPF, K, NH, NU, PRE, PRU, and UDW. The insert shows a map of southern Africa with names of countries; the grey rectangle indicates the area depicted by the topographical map.

It is possible that the species occurs in suitable habitat in between, but it is difficult to access the area as there are no roads and numerous wetlands. *Ozoroa bhangazica* has not yet been recorded in the Mozambican part of the Maputaland Centre.

Ecology:—*Ozoroa bhangazica* is confined to Maputaland Wooded Grassland (Fig. 1A), a vegetation type that extends along the coastal plain from southern Mozambique south to Richards Bay in KZN (Mucina & Rutherford 2006, South African National Biodiversity Institute 2006–2024). This grassland is particularly notable for its richness in geoxylic suffrutices, rhizomatous dwarf shrubs and forbs (Mucina & Rutherford 2006). From a phytosociological perspective, this distinctive grassland was originally classified by Myre (1964) as the *Themedo-Salacietum* association. However, Matthews *et al.* (1999) advocated for the term "woody grassland" to describe it, with "woody" underscoring the abundance of geoxylic suffrutices—likely representing the highest concentration of this growth form in any South African vegetation type. The term "wooded", as applied in the name Maputaland Wooded Grassland by Mucina & Rutherford (2006), might be misinterpreted to suggest a grassland type with scattered trees, which is not the case here. In fact, "woody" more accurately reflects the dominance of underground woody structures that account for much of the plant biomass in this ecosystem.

The landform of the coastal plain is gently undulating with low rises and inter-dune depressions (Fig. 1A). The latter are inundated at times of high rainfall because of a relatively shallow water table. *Ozoroa bhangazica* is absent from the depressions and instead grows on the dune crests and gentle slopes above hygrophilous grasslands and wetlands. Matthews *et al.* (1999) also found that geoxyles are absent from inter-dune depressions at the nearby

Sileza Nature Reserve, north of Sodwana Bay. *Ozoroa bhangazica* grows at low elevations, probably not exceeding 40 m above sea level. The soils occupied by Maputaland Wooded Grassland are moderately- to well-drained, acidic Quaternary sands and the water table is ca. 1.5–2.0 m below the surface and sometimes more (Matthews *et al.* 1999, Mucina & Rutherford 2006). The climate is subtropical/tropical and average annual rainfall is about 1200 mm, with weak seasonality (Matthews *et al.* 1999, Mucina & Rutherford 2006). There is no frost (Van Wyk & Smith 2001).

Maputaland Wooded Grassland is a fire-prone ecosystem subject to and dependent on frequent wildfires and prescribed burns (Van Wyk & Smith 2001). The geoxyle habit of *O. bhangazica* makes it a fire-adapted species (Scott-Shaw 1999), like many other taxa found in this vegetation type (Van Wyk & Smith 2001). Similar to co-occurring geoxyles, *O. bhangazica* is an obligate resprouter and it produces several to many new stems (ramets) from a lignotuber and/or subterranean woody axes following fire (Fig. 1B, C, 3A). Plants flower best several months after a fire and fruit usually matures before the next fire season, when fire will likely consume all or most aerial phytomass in the grassland. Plants growing in unburnt grassland flower much less prolifically. The grassland at Ozabeni is burnt annually by neighbouring communities and the Eastern Shores grasslands to the south are usually burnt biennially by conservation staff (C. Myhill, pers. comm.). When one of us (RGCB) visited in October 2024, most of both known localities were burnt a few months previously. At the time of the visit, many plants were flowering, but none had fruit, including the few individuals found in grassland that was not burnt in the previous dry season.

The current fire regimes at the two areas where *O. bhangazica* occurs appear to favour the persistence of adult plants while also limiting the encroachment of taller native and introduced species. However, successful seedling recruitment probably requires the uncommon combination of bare ground, adequate moisture and a sufficient gap between fires, and it is not known how often young plants are able to become established. Nonetheless, as clonal plants, geoxyles also reproduce vegetatively, and their clones are effectively "immortal," with individual clonal colonies undoubtedly capable of surviving for very long periods.

Various authors have suggested explanations for the evolution of the geoxyle habit in southern Africa, including the interaction of high rainfall and frequent fire (Maurin *et al.* 2014, Davies *et al.* 2016), frost (Burtt Davy 1922, Finckh *et al.* 2016), herbivory (Steenkamp *et al.* 2001), and edaphic factors (White 1976). Although White (1976) admitted that fire played an important role, he attributed the rise of the geoxyle habit mainly to edaphic factors, in particular seasonally waterlogged soils. As previously mentioned, in the coastal grasslands of Maputaland geoxyles, including *O. bhangazica*, are typically situated on relatively elevated, well-drained landforms such as dune crests and slopes, where the surface soils are never waterlogged (Matthews *et al.* 1999). These plants are also conspicuously absent from the lower-lying inter-dune depressions, which are the only parts of the landscape that experience clear seasonal waterlogging.

While recognising that any site condition that reduces growth rates and prevents individuals reaching fire-proof sizes favours the geoxyle lifeform, Maurin *et al.* (2014) and Davies *et al.* (2016) argue that high precipitation, which leads to increased grass fuel loads, along with frequent fires, are the primary evolutionary drivers of the geoxyle habit in African savannas. Supporting this, a study by Courtenay *et al.* (2024) examining the habitat preferences of various geoxyles and their arborescent relatives in Africa found that *Ozoroa* geoxyles typically occupy environments with the highest fire frequencies and generally high rainfall. *Ozoroa bhangazica* does not appear to be browsed by native or introduced mammalian herbivores, does not grow where soils are waterlogged, and is not subjected to frost. However, it does grow on low-nutrient soils and persists in areas characterised by high precipitation and frequent fires.

Common names:—The new species does not have a widely-used English common name and we recommend the name Maputaland Dwarf Resintree given by Scott-Shaw (1999). The name translates to *maputalanddwergharpuisboom* in Afrikaans. We do not know the Zulu name, but other *Ozoroa* species in KZN are called *isifice* or *isifico*, and it is likely that *O. bhangazica* has the same name. The name *isifico* is derived from the verb *fica* and there are a number of meanings, the most likely of which is "find" or "come upon" (A. Koopman, pers. comm.). The link to the plant is unclear to us.

Conservation status:—*Ozoroa bhangazica* is apparently confined to two areas of Maputaland Wooded Grassland in the iSimangaliso Wetland Park (South African National Biodiversity Institute 2006–2024). Nearly half of the original extent of Maputaland Wooded Grassland has been transformed, mainly for timber plantations, and 17% is conserved in the iSimangaliso Wetland Park (Mucina & Rutherford 2006).

The iSimangaliso Wetland Park is a World Heritage Site stretching from Maphelane and St Lucia in the south to Kosi Bay at the border with Mozambique (iSimangaliso Wetland Park 2025). It was established under the World Heritage Convention Act, No 49 of 1999 and the South African National Environmental Management: Protected Areas Act, 2003 (iSimangaliso Wetland Park 2025), and thus has a high level of statutory protection.

Ozoroa bhangazica occurs in two known subpopulations as defined by the IUCN (2012). These subpopulations are about 55 km apart and genetic or demographic exchange seems unlikely. It is possible that the species occurs in between the two known localities in less accessible grassland away from management tracks and tourist roads. However, the area has a long history of conservation, which predates the establishment of the iSimangaliso Wetland Park in 1999, and it is probable that experienced botanists have collected in the intervening area, at least occasionally, over several decades.

The southern subpopulation is in a part of the Park that has been developed for nature-based tourism and there is a high level of management and control over public access. This population was probably impacted when a tourist road was constructed many years ago. The population experiences limited encroachment by native and non-native woody plant species, which are not typically found in Maputaland Wooded Grassland. This is currently a minor threat because regular ecological burns, conducted by conservation staff, seem sufficient to control most of these encroaching weeds.

The plants near Lake Bhangazi North grow where management controls are harder to implement. The grassland usually burns annually when fires are lit in the Park or spread from adjacent communal lands. Adult *O. bhangazica* plants do not seem to be harmed by the fires, and they do not appear to be browsed by native or introduced herbivores, which are attracted to fresh grass following fires. It is unknown whether the fires have a negative impact on seedling establishment, although that seems likely. The threat from encroachment by woody plants is similar in the north to that experienced by plants in the south. There are several off-road vehicle tracks between Sodwana Bay and Lake Bhangazi North. New tracks are created when old tracks are eroded or the sand becomes too soft. When tracks are formed *O. bhangazica* plants may be impacted.

Most collections of *Ozoroa bhangazica* lack precise coordinates and, where precise information was recorded by collectors, the collections were made close to roads and tracks. If only exact localities are used to calculate the EOO and AOO for the new species, the areas are very small. Instead, satellite imagery available on GeoCAT was used to produce a coarse-scale map of what appears to be suitable habitat in the vicinity of precisely known localities. This will likely have produced EOO and AOO calculations that exceed the actual figures.

The EOO of *Ozoroa bhangazica* was estimated at 600 km^2. The AOO calculated was 165 km^2 for the 2 km cell width recommended by the IUCN Standards and Petitions Committee (2024). The actual AOO is probably less than 165 km^2, because the 2 km^2 cell width includes wetlands and unsuitable, degraded, or transformed terrestrial habitats. Although the AOO and EOO for *O. bhangazica* meet the thresholds for the IUCN Red List Endangered (EN) Category under Criterion B., only one of the three conditions are met (two are required), i.e. Condition (a) as the population may be severely fragmented and there are ≤5 locations (i.e. threat-based areas *sensu* IUCN Standards and Petitions Committee 2024). However, there is insufficient evidence to show that the species is experiencing a continuing decline (although that is possible) or extreme fluctuations (very unlikely) in the EOO, AOO, number of locations or subpopulations, or mature individuals (Conditions (b) and (c)).

The size of the two subpopulations is unknown. When estimating the number of mature individuals in the case of clonal organisms, the smallest entity capable of both independent survival and (sexual or asexual reproduction), i.e. the ramet, is considered a mature individual (IUCN Standards and Petitions 2024). Based on the AOO and field observations of the density of genets (and ramets), it seems possible that the total population of the species is <10 000 mature individuals. Therefore, the species might qualify for Criterion C. (small population), but there is no evidence to suggest that the thresholds for C1. (rate and size of decline) or C2. (size of subpopulations and % of mature individuals in one subpopulation) are met.

Whereas *O. bhangazica* occurs in only two widely separated and isolated subpopulations and the total population is relatively small, both populations are included in a managed protected area and there is no evidence that the current overall population is declining. Perhaps the most plausible threat to *O. bhangazica* is that of encroachment by surrounding communities into the grasslands occupied by the northern subpopulation. The risk of encroachment is unknown, but other protected areas in KwaZulu-Natal have been impacted by this threat in the past (e.g. Groenewald 2010). As the species is close to qualifying as Endangered in Criterion B. and the northern population may be under threat or declining, our recommendation is that the species be classified as Near Threatened (NT). This is consistent with the guidance provided by the Standards and Petitions Committee (2024).

Notes:—*Ozoroa bhangazica* is a range-restricted species, which occurs only on Quaternary coastal sands in Maputaland Wooded Grassland in the iSimangaliso Wetland Park, South Africa. No other *Ozoroa* species is found in this vegetation type. However, *O. obovata* (Oliver 1868: 437) Fernandes & Fernandes (1965: 161) var. *obovata* is found nearby and is a common constituent of dune and coastal forest margins and scattered bush clumps in the grassland matrix. It does not grow in open grassland and it is easily distinguished from *O. bhangazica* by being a large

shrub or small tree with leaves arranged in whorls of three (*vs.* irregularly arranged to occasionally subverticillate). *Ozoroa obovata* var. *obovata* has elliptic to obovate leaves with a broadly rounded or broadly tapered apex. On fresh growth, *O. bhangazica* has linear to narrowly elliptic leaves (Figs 2B & 3A), quite unlike those of *O. obovata* var. *obovata*. Leaves on long unburnt individuals of *O. bhangazica* (Figs 1D & 3B) are more similar to those of *O. obovata* var. *obovata*, but are irregularly and sparsely arranged (*vs.* in whorls of three and densely arranged). Even when not burnt for several years *O. bhangazica* is always less than 1.2(–1.5) m tall (Fig. 1D).

Older collections of *O. bhangazica* have most frequently been identified as *O. paniculosa* var. *paniculosa*, although more recent herbarium specimens have been recognised as a new species. Distributions of these two taxa are allopatric. *Ozoroa bhangazica* is found in grassland on the coastal plain at low elevations no more than 10 km from the sea. In contrast, *O. paniculosa* has a much wider range than *O. bhangazica* and is found in Botswana, Eswatini, Mozambique, Namibia, and the northern provinces of South Africa, as well as KZN, but excluding the coastal areas of Maputaland. Across its wide range, it grows in bushveld savanna, often on hillsides, and apparently does not occur closer to the coast than the Lubombo (Lebombo) Mountains (iNaturalist 2025). This mountain range forms the western boundary of the Maputaland Centre and is oriented approximately north-south about 40 km inland of the KZN coastline. The distribution map supplied for *O. paniculosa* var. *paniculosa* in Boon (2010) is incorrect and is a reminder that care needs to be taken in identifying *Ozoroa* plants in the field and herbarium.

Ozoroa paniculosa var. *paniculosa* is always a shrub or small tree (*vs.* a geoxylic suffrutex). Leaves are usually arranged in whorls of three or are subverticillate (*vs.* usually irregularly spirally arranged), they are relatively shorter and broader than in *O. bhangazica*, the adaxial surface is puberulous to glabrescent (*vs.* essentially glabrous), the leaf margin is somewhat thickened and undulate (*vs.* slightly thickened and ca. plane), and the principal lateral veins are raised and prominent abaxially (*vs.* not raised and only conspicuous because they appear darker than the remainder of the abaxial surface) (Fernandes & Fernandes 1966).

Three other described *Ozoroa* geoxyles are currently recognised in the FSA region. *Ozoroa schinzii* and *O. albicans* have distinctly different leaf morphology and occur in Namibia and South Africa's Limpopo Province (with *O. albicans* extending slightly into Mpumalanga Province), respectively. These two species are unlikely to be confused with *O. bhangazica*. The third species, *O. barbertonensis*, is morphologically the most similar, sharing linear to narrowly oblong leaves. However, it is a restricted-range serpentine endemic found only in the Barberton Centre of Endemism (Van Wyk & Smith 2001), where it is confined to grassland on rocky mountain slopes within Lowveld Sour Bushveld (Retief 1990), thus occupying a markedly different habitat from that of *O. bhangazica*. Additionally, their distribution ranges are separated by approximately 250 km. Further distinguishing features between *O. barbertonensis* and the new species are outlined in the diagnosis preceding the description above.

Additional specimens examined (paratypes):—SOUTH AFRICA. KwaZulu-Natal: Northern Zululand, illala [ilala] veld, [2732DA], July 1924, *Boocock s.n.* (PRF5715 in PRE!); N. [Northern] Zululand, 5 miles W of Sordwana [Sodwana] Bay, [2732DA], July 1924, *Miller & Boocock s.n.* (PRF5715 in PRE!); Lower Mbazwane, Kwa-Mbila area, 27º38'S 32º33'E, (2732DA), 14 December 1971, *Ward 7473* (K002226574!, NH0064634-0!, UDW10957! & UDW10958!); Sodwana State Forest, grassland east [west] of Lake Bhangazi [North], (2732DC) [2732DA], 5 November 1985, *Van Wyk 611* (CPF0005264!, NH0100696-0!); Sodwana State Forest, Ozabeni, nr. Lake Bangazi [Bhangazi] North, (2732DA), 25 February 1997, *Scott-Shaw 8543* (CPF0005276!); Sodwana State Forest, Ozabeni, nr. Lake Bangazi [Bhangazi] North, (2732DA), 25 February 1997, *Scott-Shaw 8558* (CPF0005277!); Osabeni [Ozabeni], close to Lake Bangazi [Bhangazi) North, (2732DA), 5 October 1997, *Matthews & Welman 1* (PRE!, PRU!); ISimangaliso wetland park [iSimangaliso Wetland Park], 2.3 km from Lake Bhengazi [Lake Bhangazi North], next to road (Sodwana Bay), 27.61114S 32.63185E, (2833AA) [2732DA], 16 June 2016, *Parbhoo S & Doarsamy 183* (NH0145456-0!); ISimangaliso [iSimangaliso] Wetland Park, Sodwana Bay, Ozabeni Grassland, ±7 km north of Bangazi Lake [Lake Bhangazi North], 27.58363S 32.641578E, (2733CC) [2732DA], 13 November 2016, *Mtshali 154* (NH0145399-0!); Isimangaliso [iSimangaliso] Wetland Park, Ozabeni section, 27°34'45.26"S 32°38'44.02"E, (2732DA), 15 October 2024, *Boon 184* (NU0138914!); Isimangaliso [iSimangaliso] Wetland Park, Ozabeni section, 27°34'45.26"S 32°38'44.02"E, (2732DA), 15 October 2024, *Boon 185* (NU0138915!); Isimangaliso [iSimangaliso] Wetland Park, Ozabeni section, 27°34'45.26"S 32°38'44.02"E, (2732DA), 15 October 2024, *Boon 187* (NH!); Mpangazi, [2732DC], 10 January 1964, *Strey 5084* (NH0051495-0!, PRE0272996-0!); Sand Flats, Bazwana, Mpangazi, [2732DC], 10 January 1964, *Strey 5047* (K002226682!, NH0051516-0!, PRE0270506-0!); St Lucia Park, W [west] of Bangazi Lake [Lake Bhangazi South], [2832AB/BA?], 12 December 1960, *Ward 3631* (NU0032838!, NH0049280-0!, PRE0462805-0!); St Lucia Park, west of Bangazi Lake [Lake Bhangazi South], [2832AB/BA?], 12 December 1960, *Ward 3634* (NU0032796!); Lake St Lucia, East Shore [Eastern Shores], (2832AB), 11 January 1975, *Taylor 279* (NU0032797!); St Lucia Estuary Game Park, E [east] of Vidal Road, [2832AB/AD?], 9 November 1977, *Pooley 1935* (NU0032836!);

St Lucia, E (Eastern) Shores, 30 March 1981, *MacDevette 22b* (CPF0005263!); Western [Eastern] shores, Sibomvini [Ezibomvini], (2832AB), 10 March 1982, *Nicholas 1257* (CPF0005260!, K002226583!); Eastern Shores State Forest, Sibomvini [Ezibomvini] grassland, (2832AB), 11 November 1985, *MacDevette 349* (CPF0005262!, NH0085858-0!); Eastern Shores, Sibomvini [Ezibomvini], monitoring site MWG3, (2832AB), 10 December 2002, *Scott-Shaw s.n.* (CPF0005271!); Eastern Shores, Sibomvini [Ezibomvini], monitoring site MWG3, (2832AB), December 2003, *Scott-Shaw s.n.* (CPF0005272!); Isimangaliso [iSimangaliso] Wetland Park, St Lucia E., Sibomvini [Ezibomvini] South, 28°00'42"S 32°29'52"E [ca. 28°8'55"S 32°29'40"E], (2832AB), 16 February 2006, *Ward, Jewitt & Taylor 16438* (CPF0005246!); Isimangaliso [iSimangaliso] Wetland Park, Eastern Shores, 28°9'21.54"S 32°29'58.20"E, (2832AB), 13 October 2024, *Boon 186* (NH0154846-0!); Isimangaliso World Heritage Site [iSimangaliso Wetland Park], Eastern Shores, south-west of Lake Bangazi [Lake Bhangazi South], 28°9'3.42"S 32°0'6.74"E [28°9'4.90"S 32°30'6.76"E], (2832BA), 22 June 2019, *Boon & Church 152* (NH0152513-0!).

Feely, Tinley & Ward 27 (K002226577!, NH048745-0!, CPF0032795! & CPF0032841!) is a gathering of *O. bhangazica*, but there is insufficient information on the label to determine near which Lake Bhangazi it was collected. The details of the gathering are: West of Lake Bengazi [Bhangazi], 16 January 1960.

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