



A taxonomic revision of *Inulanthera* (Asteraceae: Anthemideae)



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ABSTRACT

The shrubby genus *Inulanthera* is largely confined to South Africa with a single species each endemic to Angola, Madagascar and Zimbabwe. The genus is unusual in the tribe Anthemideae in its conspicuously tailed anthers. *Inulanthera* has not been treated taxonomically throughout its range before and we provide a complete taxonomic revision of the genus in which we recognize nine species, reducing *I. calva* to synonymy in *I. dregeana*, and lectotypify the latter name. In situ studies of several of the species revealed that while most of the species are multi-stemmed resprouters, *I. leucoclada* is a single-stemmed, obligate reseeders. The species differ in their life history; leaf shape, division and vestiture; the presence or absence of paleae; and the structure of the pappus.

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1. Introduction

The shrubby genus *Inulanthera* Källersjö (Asteraceae: tribe Anthemideae) was until now considered to comprise ten species, of which seven were restricted to South Africa (mainly KwaZulu-Natal), with the remaining three species endemic to either Angola, Madagascar or Zimbabwe, respectively (Källersjö, 1986). The genus was diagnosed by Källersjö (1986) on the basis of its tailed anthers and cypselas lacking secretory cavities and with elongated cells in the ribs, and includes species formerly placed in *Athanasia* L. and *Penztia* Thunb. (Källersjö, 1986). The tailed anthers, a generic synapomorphy for *Inulanthera*, are also characteristic of the tribe Inuleae but within Anthemideae are found otherwise only in *Osmitopsis* Cass., the earliest diverging lineages of this tribe, and *Hippolytia* Poljak. (Shih, 1979; Bremer and Humphries, 1993; Oberprieler et al., 2009).

The subtribal placement of *Inulanthera* is unresolved in the recent classification of Oberprieler et al. (2009). Källersjö (1986) had earlier suggested that the closest relatives of *Inulanthera* may be two genera from the Canary Islands, *Gonospermum* Less. and *Lugoa* DC. (both

Anthemideae), with which it shares glandular-punctate leaves with broad, rounded leaf lobes in some species. However, the classification of Oberprieler et al. (2009) places these two genera in subtribe Anthemidinae of the Eurasian and Mediterranean clade. Bremer and Humphries (1993) treated *Inulanthera* as a member of the subtribe Gonosperminae but the current molecular reconstructions of Oberprieler et al. (2009) suggest a closer relationship with *Ursinia* Gaertn. and other early diverging largely southern African subtribes. This remains to be confirmed, as analyses of cpDNA *ndhF* place the genus in a well-supported clade closer to subtribe Ursiniinae, whereas analyses based on nrDNA ITS place it closer to subtribe Athanasinae. This incongruence in molecular data militates against the accommodation of the genus in any of the subtribes currently recognized in the recent molecular reconstructions of Oberprieler et al. (2009).

Ursinia is morphologically distinct from *Inulanthera* in its radiate heads, and in the weakly sagittate anthers with cordate apical appendages (Prassler, 1967; Magee et al., 2014). The distinctive cypselas are obovoid, straight or sometimes curved and usually 5-ribbed, with a basal tuft of hairs or sometimes smooth. The pappus is either uniseriate of 5 or 10 ovate scales, or biseriata of five outer scales and five inner subulate scales, or rarely lacking (Prassler, 1967; Magee et al., 2014).

A recent study of the essential oils of the aromatic Madagascan endemic species, *Inulanthera brownii*, suggests that volatile compounds in this species may be active against cancer (Rasoanaivo et al., 2013;

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Bayala et al., 2014). In southern Africa, only *I. thodei* has been reported to have traditional uses, where it is used by the Basotho to fumigate huts after a death has occurred (Moffett, 2010).

Inulanthera has never been taxonomically treated in its entirety, and in consequence there is no key to the species, accurate distribution data and maps, or complete typifications with the partial exception of the seven species treated under *Athanasia* by Hilliard (1977). We present here a comprehensive taxonomic treatment of the genus, including a key to the species, complete nomenclature and typifications, detailed descriptions and illustrations, and the known geographical distribution for all the species.

2. Materials and methods

Herbarium material was studied from BOL, MO, NBG, NH, NU, P, PRE and SAM (abbreviations according to Holmgren et al., 1990). Four of the South African species were studied in the field. Specimens examined are cited by country and province following the Quarter Degree Reference System (Edwards and Leistner, 1971; Leistner and Morris, 1976).

Author citations are provided in the taxonomic section and not repeated elsewhere except for names not listed in this section. Drawings were prepared with the aid of an Olympus SZ61 stereomicroscope and Zeiss compound microscope.

Leaf anatomy was examined in *Inulanthera dregeana*, *I. leuoclada*, and *I. thodei*. Fresh material was fixed in FAA (formaldehyde:acetic acid:96% alcohol:water; 10:5:50:35) and embedded in paraffin wax. Ultramicrotome sections were double-stained with alcian blue and safranin following the method of Rudall (1995).

3. Results and discussion

3.1. Vegetative morphology

Species of *Inulanthera* are largely multi-stemmed resprouters, with only *I. leuoclada* a single-stemmed, obligate reseeder (Fig. 1D). They are pubescent or glabrous shrubs or shrublets up to 2 m high, with sub-erect stems and spreading branches (Fig. 1). Stems are simple or

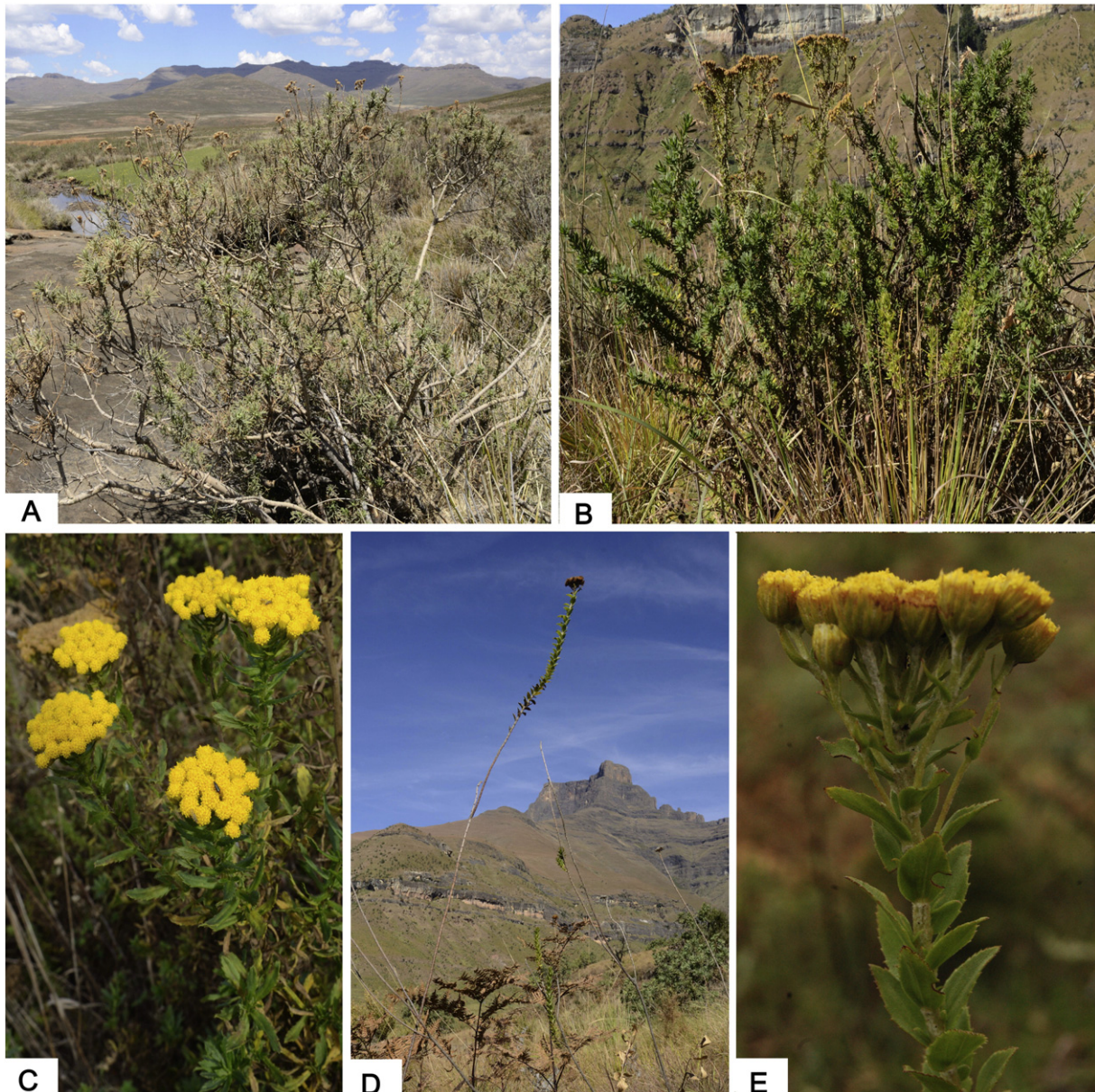


Fig. 1. General morphology of *Inulanthera*. A. Habit of *I. thodei* showing twiggly branches. B. Habit of *I. dregeana* showing numerous leafy branches. C. The oblong to narrowly ovate leaves, and compound corymb of *I. dregeana*. D. Single-stemmed growth form of *I. leuoclada*. E. Corymb of *I. leuoclada*.

subsimpler to sparsely branched in the upper half or from near the base. The indumentum is composed of simple, multicellular trichomes.

The leaves of *Inulanthera*, like most members of Anthemideae, are alternately arranged. The species vary widely in leaf morphology, and this is an important diagnostic character. Simple leaves are characteristic of *I. dregeana*, *I. montana* and *I. leucoclada* but leaves are lobed, trifold or pinnatisect to bi-pinnatisect in the remaining species. The leaves are generally coriaceous in texture. Conspicuous axillary tufts or shoots are developed in *I. brownii*, *I. coronopifolia*, *I. dregeana*, *I. montana* and *I. nuda*.

The leaves are glandular-punctate in all species, each pit containing a solitary, sunken, short-stalked gland. The leaves are otherwise glabrous in *I. leucoclada* and *I. montana* but are variously pubescent in the other species, with a vestiture of unbranched, multicellular hairs. In some of the pubescent species, the leaves are \pm discolorous (e.g. *I. schistostephioides*, *I. brownii* and *I. dregeana*), most markedly in the Angolan species, *I. schistostephioides*, in which the upper surface is thinly cobwebby and dark green, and the lower surface is densely woolly and yellowish-beige. The lower leaf surface in *I. brownii* is thinly and unevenly cobwebby giving it a silvery-grey appearance, with the upper surface very densely woolly and green in colour. In *I. thodei*, the

glandular hairs are restricted to grooves on the leaf undersurface (Fig. 14C).

3.2. Reproductive morphology

The inflorescence in all *Inulanthera* species is a corymbose synflorescence of few to several individual corymbs. The individual corymbs are either congested with the peduncles obscured (*I. brownii*, *I. coronopifolia*, *I. dregeana*, *I. leucoclada*, *I. montana*, *I. nuda*, *I. schistostephioides* and *I. thodei*) or open with individual peduncles easily visible (*I. tridens*). The corymbs are doubly compounded in all species except in *I. tridens*, and range in diameter from 40 mm (e.g. *I. montana*) to 130 mm (e.g. *I. dregeana*). Capitula are discoid and paleate in all species except in the Zimbabwean endemic *I. nuda*, in which the capitula are epaleate. The involucre is subglobose in most species but varies from campanulate to subglobose in *I. dregeana* and *I. schistostephioides*. The involucre bracts are either pubescent (*I. brownii*, *I. dregeana*, *I. nuda*, *I. schistostephioides*, *I. thodei* and *I. tridens*) or glabrous (*I. coronopifolia*, *I. leucoclada* and *I. montana*). *Inulanthera tridens* is distinctive in having apically dark-marked bracts. The yellow florets are bisexual and funnel-shaped with five, spreading lobes.

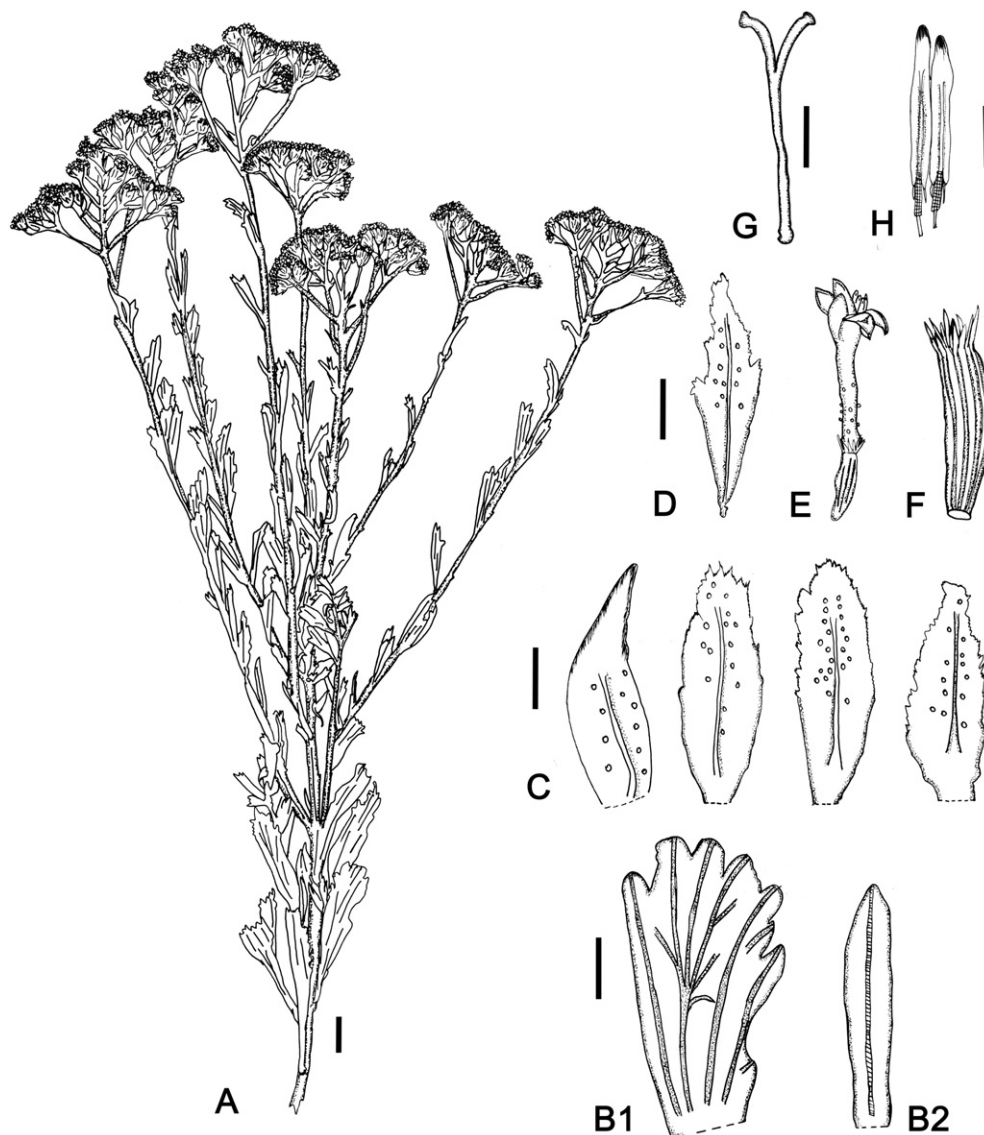


Fig. 2. *Inulanthera brownii*, Cours 5160 (P). A. Flowering branch. B1. Typical mature leaf. B2. Leaf near the synflorescence. C. Involucre bracts. D. Paleate. E. Floret. F. Cypsel. G. Style. H. Anthers. Scales: A and B: 10 mm; C–H: 1 mm. Artist: S.L. Magoswana.

Cypselas morphology is an important character in circumscribing genera in Anthemideae (Oberprieler et al., 2009; Magee et al., 2015). Cypselas in *Inulanthera* are obovoid and slightly curved at the base, with 7 to 10 prominent, rounded ribs. The surface is smooth in most species but papillate-scabrid in *I. coronopifolia* and *I. montana*, and sometimes in *I. dregeana*. Small, sessile glands are sometimes present between the ribs in *I. dregeana* and *I. tridens*. Anatomically, the cypselas lack longitudinal secretory cavities in the ribs. Each rib contains a single, separate longitudinal sclerenchyma bundle, unlike in the superficially similar genus *Athanasia*, in which the rib bundles are \pm continuous in a sclerenchyma cylinder (Källersjö, 1986). The ribs are projected apically into small horns or scales to form a pappus. The development of a pappus in one form or another is characteristic of the family Asteraceae (Funk et al., 2009). The pappus is generally interpreted as a reduced or modified calyx that is believed to aid primarily in the dispersal of the cypselas (Small, 1918; Mukherjee and Sarkar, 2001; Jana and Mukherjee, 2014), but may also protect the ovaries from predation in some instances (Stuessy and Garver, 1996). In *Inulanthera* the pappus is an extension of the cypselas ribs, with each rib extended as a small horn (*I. brownii*, *I. coronopifolia*, *I. montana*, *I. thodei* and *I. tridens*) or as \pm flattened scale (*I. nuda* and *I. schistostephioides*), sometimes partially fused into a coroniform structure. In *Inulanthera dregeana* and *I. leuocladia* both types of pappus structures were found, sometimes within a single population. *Inulanthera calva* was previously recognized as a separate species solely on the basis of this character. We regard the two types of pappus structures as homologous, based on their similar position as extensions of the ribs, and their co-occurrence in two species (*I. dregeana* and *I. leuocladia*).

The anthers in the Anthemideae are generally obtuse to acute at the base. Tailed anthers, a generic synapomorphy for *Inulanthera* (Källersjö, 1986; Bremer and Humphries, 1993), are characteristic of Inuleae but within Anthemideae are found otherwise only in *Osmitopsis* and *Hippolytia* (Bremer, 1972; Shih, 1979).

4. Taxonomy

Inulanthera Källersjö in Nord. J. Bot. 5 (6): 539 (1986); Bremer & Humphries in Bull. Brit. Mus. (Nat. Hist.), Bot. 23: 95 (1993). Type: *I. calva* (Hutch.) Källersjö (= *I. dregeana* (DC.) Källersjö).

Single to multi-stemmed shrubs, 0.3–2 m tall, usually resprouting from a woody caudex or rarely reseeding; stems sub-erect, simple or branched from near base or in upper half, 1–8 mm diam., striate, glabrous or sparsely lanate. Leaves alternate, sub-erect to incurved or spreading to recurved, linear to obovate or pinnatisect to bipinnatisect, 2–70 \times 1–40 mm, entire, dentate or serrate; base tapering or cuneate to auriculate, plane or margins revolute, glabrous to villous or whitish woolly, sometimes \pm discolorous, glandular-punctate, coriaceous; axillary shoots absent or developed in upper or lower leaves. Capitula homogamous, in sparse or dense compound corymbs 15–130 mm across; inflorescence branches 5–40 mm long, sometimes with primary branches 15–40 mm long and secondary branches 3–35 mm long; inflorescence bracts linear to elliptic or lanceolate, 2–10 \times 1–9 mm. Involucre campanulate or subglobose, 3–10 \times 3–12 mm, involucre bracts 3- to 5-seriate, glabrous to pubescent or cobwebby to densely whitish woolly, conspicuously orange gland-dotted; outer bracts ovate to elliptic or lanceolate, 2–10 \times 0.5–3.0 mm, obtuse to acuminate or attenuate, serrulate. Receptacle conical, paleate or rarely epaleate (*I. nuda* only). Florets bisexual, 20 to 75, yellow; corolla funnel-shaped, 5-lobed, glandular, tube \pm as long as limb. Anthers tailed, apical appendages ovate, endothelial cells polarized. Style terete with thickened base, branches truncate, papillate apically. Cypselas obconic or obovoid, 1.0–2.5 \times 0.5–1.0 mm, prominently 7- to 10-ribbed, brownish-gold, glabrous to scabrid, sessile glands sometimes present between ribs (*I. dregeana* and *I. tridens*); non-myxogenic. Pappus formed by ribs extended apically into small horns or scales 0.2–0.5 \pm 0.5 mm, scales sometimes becoming broadly membranous and basally connate.

Diagnostic characters

Inulanthera shares tailed anthers with the shrubby South African genus *Osmitopsis* but is distinguished from that genus by the discoid capitula (generally in corymbs) and apically papillate, linear styles. *Osmitopsis* is characterised by conspicuously radiate capitula with white ray florets and apically penicillate, linear to oblong styles.

Distribution and ecology

Nine species distributed in South Africa from Eastern Cape Province through KwaZulu-Natal and Free State, extending to Lesotho and Swaziland, with a single species endemic to either Angola (*Inulanthera schistostephioides*), Madagascar (*I. brownii*) and Zimbabwe (*I. nuda*). Occurring on mountain slopes in thick grassland, on forest margins and bush clumps or along streams, often on dolerite, sandstone or basalt.

Key to the species of *Inulanthera*

1. Primary leaves without axillary leaf tufts or shoots:
 2. Plants single-stemmed; leaves glabrous, sessile, ovate to lanceolate and sharply serrate **4. *I. leuocladia***
 - 2'. Plants multi-stemmed; leaves pubescent, at least beneath, narrowed at base or petiolate, obovate to elliptic, entire or variously lobed but not sharply serrate:
 3. Leaves pinnatisect; involucre bracts rounded; endemic to Angola..... **7. *I. schistostephioides***
 - 3'. Leaves entire to 2- or 3-lobed, involucre bracts attenuate or obtuse; widespread in South Africa, Lesotho and Swaziland:
 4. Straggling shrublets; leaves narrowly oblong to elliptic, entire or 3-lobed with lanceolate lobes; involucre bracts attenuate with dark apices **9. *I. tridens***

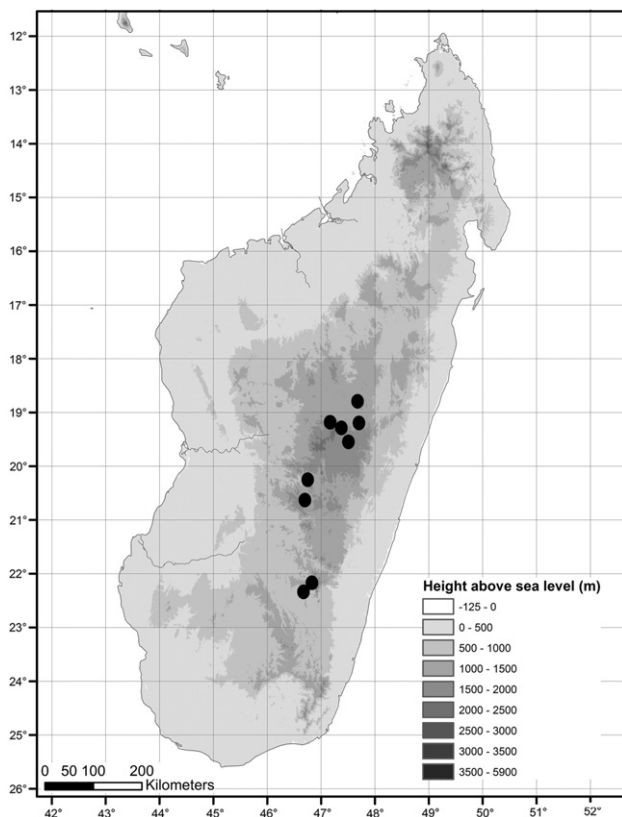


Fig. 3. Known distribution of *Inulanthera brownii*.

- 4'. Stout rounded shrubs; leaves linear or deeply 2- or 3-lobed with linear lobes; involucre bracts obtuse without dark apices **8. *I. thodei***
- 1'. At least upper primary leaves with axillary leaf tufts or shoots:
5. Leaves pinnatisect:
6. Receptacle paleate; involucre bracts glabrous; leaves ≤ 8 mm long by ≤ 2 wide; endemic to South Africa **2. *I. coronopifolia***
- 6'. Receptacle epaleate; involucre bracts pubescent; leaves ≥ 10 mm long by ≥ 5 mm wide; endemic to Zimbabwe **6. *I. nuda***
- 5'. Leaves entire, or variously lobed but never pinnately cut:
7. Leaf margins sharply and regularly serrate to base; leaves and involucre bracts glabrous **5. *I. montana***
- 7'. Leaf margins lobed or serrate in distal half only; leaves and involucre bracts cobwebby to glabrescent:
8. Leaves sub-erect, obovate to oblanceolate, 3- to 10-crenate or -dentate in distal half, 4–15 mm wide, base attenuate; endemic to Madagascar..... **1. *I. brownii***

- 8'. Leaves spreading to recurved, oblong to narrowly ovate, 3- to 5-lobed, 3–5 mm wide, base cuneate; endemic to South Africa **3. *I. dregeana***.

1. *Inulanthera brownii* (Hochr.) Källersjö ex D.J.N.Hind in Kew Bull. 69: 9499 (2014). *Inulanthera brownii* (Hochr.) Källersjö in Nord. J. Bot. 5 (6): 539 (1986), nom. illeg. [basionym not cited]. *Athanasia brownii* Hochr. in Annuaire Conserv. Jard. Bot. Genève: 120 (1908); Humbert, Flore de Madagascar et des Comores, Composées, vol. 189 (3): 670 (1963). Type: Madagascar, Imerina around Mamarivo, 1903, *Rusillon 54* (P, lecto. – image!, designated by Källersjö (1986); K – image!, isolecto.)

Multi-stemmed shrub 1–2 m, resprouting from a woody caudex, stems simple or sparsely branched in upper half, branches 1–5 mm diam., sparsely grey lanate to glabrescent. Leaves sub-erect to incurved, obovate to oblanceolate, sometimes narrowly oblong towards the inflorescence, 10–50 × 4–15 mm, 3- to 10-crenate to -dentate in distal half, teeth callose-tipped, base tapering, margins revolute, \pm discoloured, upper surface thinly and unevenly cobwebbed, sometimes glabrescent, lower surface very densely woolly, coriaceous; axillary shoots developed in upper leaves. Capitula in dense compound corymbs

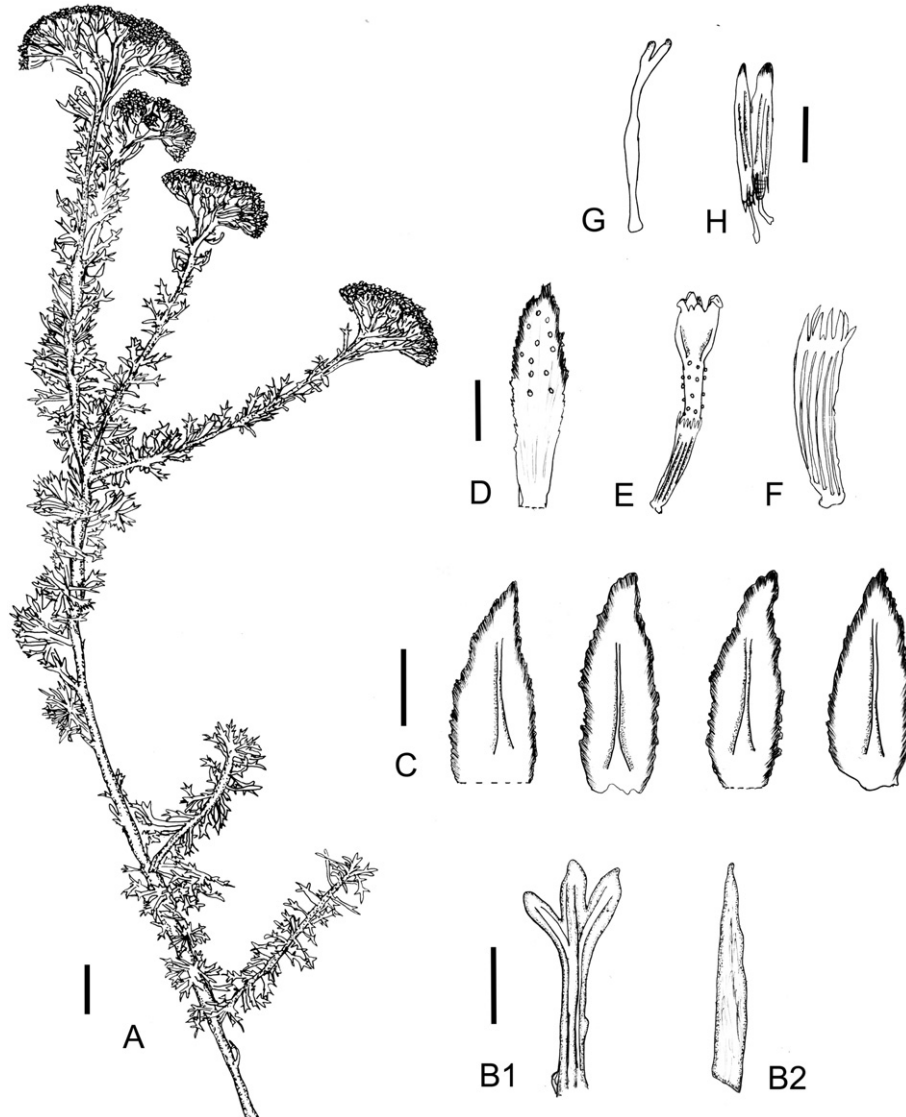


Fig. 4. *Inulanthera coronopifolia*, Bester 2711 (NU). A. Flowering branch. B1 and B2. Leaf. C. Involucre bracts. D. Palae. E. Floret. F. Cypsel. G. Style. H. Anthers. Scales: A and B: 1 cm; C–H: 1 mm. Artist: S.L. Magoswana.

20–65 mm across, primary branches 20–35 mm long, secondary branches 4–10 mm long, inflorescence bracts elliptic, 2–8 × 1–3 mm. *Involucre* campanulate, 3–6 × 4–7 mm, cobwebby; outer bracts ovate to elliptic, 2–4 × 1–2 mm, acuminate, margins serrulate. *Receptacle* paleate. *Florets* 25 to 30. *Pappus* formed by cypselas ribs extended apically into horns 0.2–0.3 mm long. *Cypselas* obconic, 1–2 × ± 0.5 mm, prominently 7- to 10-ribbed, brownish-gold, glabrous. Fig. 2.

Diagnostic characters

Inulanthera brownii shares discolorous and pinnatisect leaves with *I. schistostephioides* but is distinguished by its sub-erect, simple, obovate to oblanceolate leaves (Fig. 2B1) with the margins 3- to 10-crenate in the upper half and very densely woolly on the lower surface.

Distribution, ecology and phenology

The species is endemic to Madagascar, where it occurs in montane grassland on quartzite soils (Fig. 3). It is known under the vernacular name 'ramijengy' (Rasoanaivo et al., 2013). Flowering is from April to September.

Additional specimens examined

Madagascar: **1847 (Antananarivo)**: near Antananarivo (–DC), Decary 6038 (P). **1947 (Ankaratra)**: Central Region, Ankaratra (–AA), Rousson s.n. (P); Ankaratra, Nature Reserve (–AA), Louvel 12 (P); grasslands of Ziafazasonu (–AB), Bâthie 3180 (P); grasslands above Mangakatompô (–AD), Bossier 16008 (P); Manjakatompô (–AD), Benoist 1104 (P). **2046 (Ikalamavony)**: between Hanbalomamfo and Jhemo (–BD), Bâthie 2964, 3370 (P); mountains west of Itremo (west Betsileo) (–DA), Humbert 30128 (P). **2246 (Ambalavao)**: Semdrisoa township, Mount Andrigitra, Soandra (–BB), Cours 5160 (P); mountains of Andringitra (Iratsy), valleys of Rimbava and surrounding mountains Antsifotra (–BB), Humbert 3641 (P). **Precise locality unknown**: Madagascar, Homolle 1232 (P); Setroko, Forest Services Madagascar s.n. (P).

2. *Inulanthera coronopifolia* (Harv.) Källersjö in Nord. J. Bot. 5 (6): 539 (1986). *Athanasia coronopifolia* Harv. in Fl. cap. 3: 191 (1865); Hilliard, Compositae in Natal: 338 (1977). Type: South Africa, [KwaZulu-Natal], between [Pieter] Maritzburg and Ladysmith, [without date], Gerrard and M'Ken 279 (TCD, holo – image!; S – image!, iso.).

Multi-stemmed shrub 0.45–1.0 m, resprouting from a woody caudex, stems simple to sparsely branched in upper half, branches 2–3 mm diam., villous to glabrescent. *Leaves* sub-erect to recurved, elliptic, 2–8 × 1–2 mm, pinnatisect, lobes 4 to 6, linear to lanceolate, 1–2 mm long, base cuneate, margins revolute, villous or sometimes glabrescent, coriaceous; axillary shoots developed in lower leaves. *Capitula* in sparse compound corymbs 35–65 mm across, branches 8–20 mm long; inflorescence bracts lanceolate, 2–5 × 1–2 mm. *Involucre* campanulate to subglobose, 3–6 × 4–9 mm, cobwebby to glabrescent; outer bracts lanceolate, 2–3 × 1–2 mm, acuminate, margins serrulate. *Receptacle* paleate. *Florets* 65 to 70. *Pappus* formed by cypselas ribs extended apically into horns 0.3–0.5 mm long. *Cypselas* obovoid, 1–2 × 0.5–1.0, prominently 8- to 10-ribbed, glabrous. Fig. 4.

Diagnostic characters

Inulanthera coronopifolia shares glabrous involucre bracts with the simple-leaved species *I. leucoclada* and *I. montana* but is readily distinguished by its slender stems (Fig. 4A) with axillary shoots in the nodes of the lower leaves, small (<10 mm long) pinnatisect leaves, and relatively few heads (<30) in a simple or compound corymb vs. the larger corymbs, usually more than 30 mm in diameter in both *I. leucoclada* and *I. montana*, and compound corymbs with numerous heads, more than 30 in *I. montana* and up to 70 in *I. leucoclada*.

Distribution, ecology and phenology

This species occurs along the foothills of the Drakensberg from Nottingham Road and Giant's Caste in southern KwaZulu-Natal to Ugie in Eastern Cape, on rocky slopes in grassland above 1700 m (Fig. 5). Flowering is from March to April.

Additional specimens examined

South Africa. KWA-ZULU NATAL: **2929 (Underberg)**: Giant's Castle Game Reserve (Headquarters) (–AB), Trauseld 745 (NU); Ntabamhlophe (–BA), Hilliard 1471 (NU); Mulungane above Carter's Nek, Farm 'Surprise' (–BC), Hilliard 8231 (NU); Gladstone's Nose (–BC), Wright s.n. (NU); Coleford Nature Reserve, Sunnyside (–CD), Hilliard and Burtt 9548 (NU); Glengariff, Prosperity, Marwaga (–DC), Rennie 380 (NU); Nduduma, 'Glengariff' (–DC), Rennie s.n. (NU). **2930 (Pietermaritzburg)**: top of hill near Curry's Post (–AC), Wood 4457 (NH); Lion's River District, Fort Nottingham commonage (–AC), Hilliard and Burtt 10338 (MO, NU); Nottingham road (–AC), Maclear 810 (MO, NH). EASTERN CAPE: **3127 (Lady Frere)**: Barkly East, Saalboom Nek, S of Clifford (–AB), Hilliard and Burtt 12267 (NU). **3128 (Umtata)**: Maclear, Farm Cromarty, ± 18 km west of Ugie (–AA), Bester 2711 (NU); Baziya Mountain (–CB), Hilliard and Burtt 13,893 (NU).

3. *Inulanthera dregeana* (DC.) Källersjö in Nord. J. Bot. 5 (6): 539 (1986). *Hymenolepis dregeana* DC., Prodr. 6: 85 (1838). *Athanasia dregeana* (DC.) Harv. in Fl. cap. 3: 191 (1865); Hutch. in Burtt Davy and Hutch., Bull. Misc. Inform. Kew: 83 (1936); Hilliard, Compositae in Natal: 338 (1977). Type: South Africa, [Eastern Cape], between Umsikaba and Umzimvubu rivers, [without date], Drège 5038 (G-DC, holo. – image!; S – image!, iso.)

Hymenolepis punctata DC., Prodr. 6: 85 (1838). *Athanasia punctata* (DC.) Harv. in Fl. cap. 3: 190 (1865), nom. illeg. non Berg. (1767). Type: South Africa, [Eastern Cape], 'Kroemrivier' [Kromrivier], Drège 3982 (G-DC, lecto – image!, designated here; P – image!, SAM!, isolecto). [Syntypes: South Africa, [Western Cape], 'ad fl. Gauritz [Gourits], without date, Burchell 5055 (G-DC); South Africa, [Eastern Cape], 'terr. Cesso et Cafrorum', [without date], Ecklon s.n. (G-DC)]. Note: We select the Drège syntype as being represented also at P and SAM.

Athanasia dregeana var. *sessilis* Burtt Davy in Burtt Davy and Hutch., Bull. Misc. Inform. Kew: 83 (1936). Type: South Africa, [Mpumalanga], Lydenburg, [without date] McLea 5730 (BOL, holo.!).

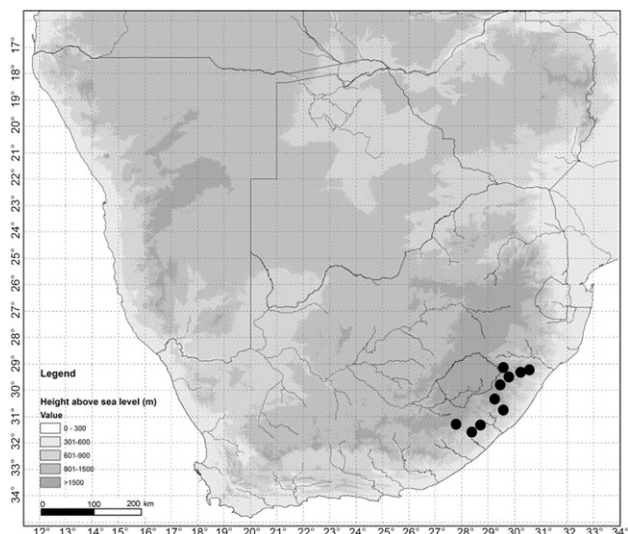


Fig. 5. Known distribution of *Inulanthera coronopifolia*.

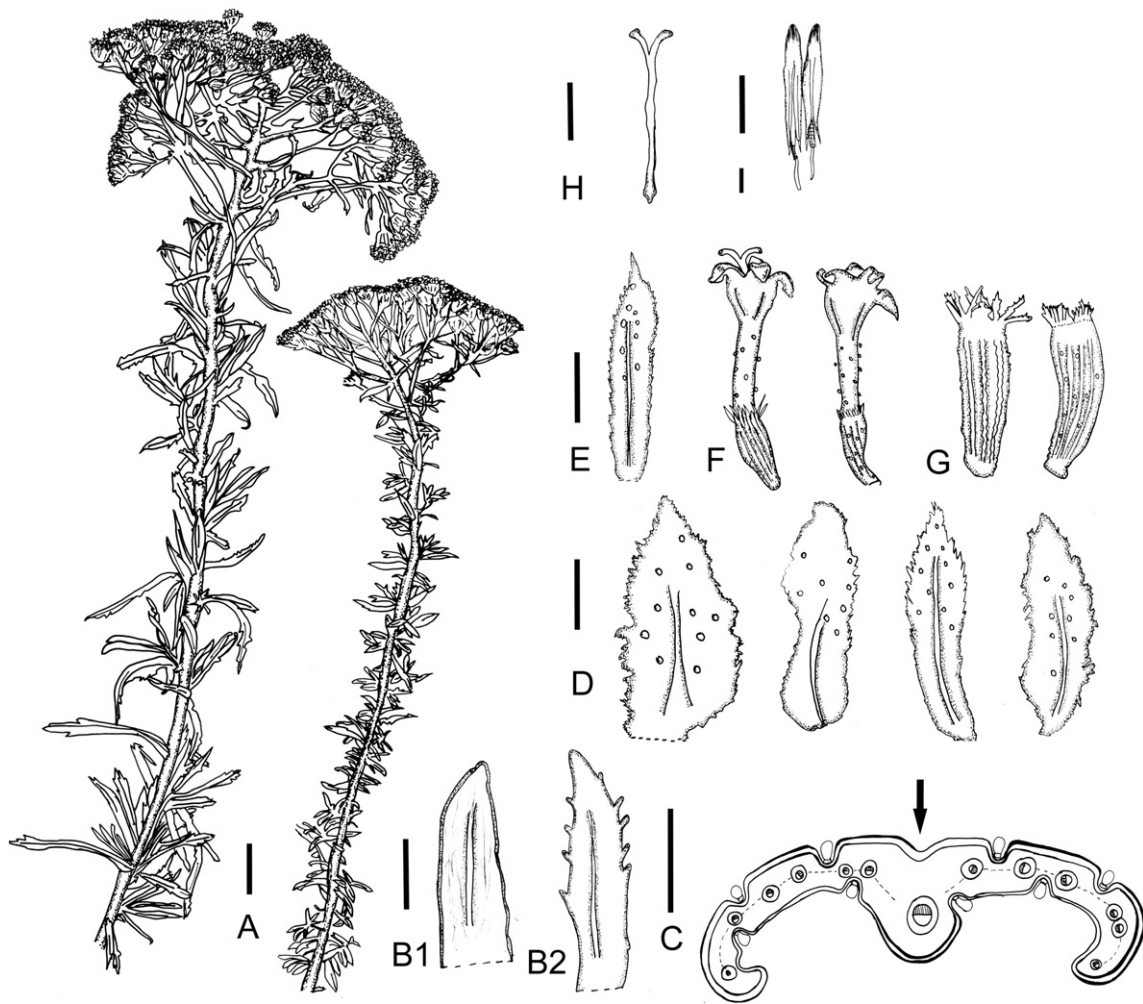


Fig. 6. *Inulanthera dregeana*, Steyn 1057 (NBG). A. Flowering branch. B1 and B2. Leaf. C. Leaf tissue plan (Magee 1077, (NBG)). D. Involucral bracts. E. Palae. F. Florets. G. Cypselas. H. Style. I. Anthers. Arrow indicates leaf midrib. Scales: A and B: 10 mm; C–H: 1 mm. Artist: S.L. Magoswana.

Athanasia calva Hutch. in Burtt Davy and Hutch., Bull. Misc. Inform. Kew: 83 (1936), syn. nov.; Hilliard, Compositae in Natal: 338 (1977). *Inulanthera calva* (Hutch.) Källersjö in Nord. J. Bot. 5 (6): 539 (1986). Type: South Africa, [Mpumalanga], Barberton District, Saddleback Mountain, Mar. 1891, Galpin 1312 (K, holo.; BOL!, NH – image!, PRE!, iso.).

Multi-stemmed shrub 1–2 m, resprouting from a woody caudex, stems simple or sparsely branched in upper half, branches 3–6 mm diam., grey lanate to glabrescent. Leaves spreading to recurved, oblong to narrowly ovate, 8–45 × 3–5 mm, lobes 3 to 5, linear to lanceolate, 1–2 mm long, base tapering or cuneate, margins entire to serrulate, thickened, ± discolorous, upper surface sparsely pubescent or glabrous, lower surface thin and unevenly cobwebbed, sometimes glabrescent, coriaceous; axillary shoots developed in upper leaves. Capitula in dense compound corymbs 35–130 mm across, primary branches 20–40 mm long, secondary branches 10–20 mm long; inflorescence bracts narrowly ovate to lanceolate, 1–5 × 1–2 mm. Involucre campanulate to subglobose, 3–5 × 3–6 mm, cobwebbed or glabrous; outer bracts ovate to elliptic, 2–4 × 1–2 mm, acuminate, margins serrulate. Receptacle paleate. Florets 25 to 30. Pappus formed by cypselas ribs extended apically into horns 0.2–0.3 mm long, sometimes becoming broadly membranous and forming scales, partially fused into a coroniform structure. Cypselas obconic, 1–2 × ± 0.5, prominently 8- to 10-ribbed, glabrous to scabrid, sometimes with sessile glands between ribs. Fig. 6.

Diagnostic characters

Inulanthera dregeana can easily be confused with *I. montana*, with which it shares simple or variously lobed leaves, but can be distinguished by its narrowly oblong to narrowly ovate, lobed leaves (Fig. 6B1–B2), 3–5 mm wide, versus lanceolate to obovate leaves 4–10 mm wide in *I. montana*. The pappus is either an extension of the ribs into prominent horns or broader membranous scales ± fused below into a crown-like structure (Fig. 6F). The cypselas are usually glabrous but sessile glands may be present between the ribs.

Plants with horn-like rib extensions were segregated until now as *I. calva*, and plants with scale-like pappus were recognised as *I. dregeana*. Additional characters cited by Hilliard (1977) for *I. calva* were the ± minutely scabrid ribs, sometimes with sessile glands between them. Other than this, the plants are indistinguishable from typical *I. dregeana*. We have examined several populations in the field in southern KwaZulu-Natal [Nottingham commonage (Pietermaritzburg), Royal Natal National Park (Pietermaritzburg), Coleford Nature Reserve (Bergville), West of Ugie, Mt. Insizwa (Mt. Alyiff), Umkhambati Nature Reserve (Port St. Johns) and Naude's Nek (Matatiele)] and find that the two pappus types grade into one another without any clear distinction. The variation in pappus form has a geographic component: plants from the south Western Cape and Eastern Cape consistently have a pappus of scales fused at the base whereas those from further inland through KwaZulu-Natal to Mpumalanga mostly have simple,

horn-like pappus extensions, but some populations have both pappus forms plus intermediates between them.

Distribution, ecology and phenology

This species is widely distributed in eastern South Africa, from the Kammanassie Mountains in Western Cape through the Eastern Cape, KwaZulu-Natal and Mpumalanga to Limpopo and the Swaziland highlands, occurring in thick grassland and on forest margins above 1200 m (Fig. 7). The species flowers from March to May.

Additional specimens examined

South Africa. LIMPOPO: **2230 (Messina)**: Sibasa District, Tate Vondo Forest (–CD), *Hemm* 126 (PRE). **2330 (Tzaneen)**: Wolkberg 634LT, near Kreek (–CC), *Muller and Scheepers* 194 (PRE). MPUMALANGA: **2430 (Pilgrim's Rest)**: Feëland just outside Graskop (–DD), *Kluge* 1840 (PRE); Pilgrim's Rest, Stanley Bush hill (–DD), *Matthews* 546 (MO). **2530 (Lydenburg)**: Sabie Valley, hillside (–AB), *Galpin* 12206 (BOL); Formosa Mountain, Long Tom Pass (–BA), *Burrows and Burrows* 7653 (PRE); Foot of Mount Formosa (–BA), *Koekemoer* 2283 (PRE); 'Bakenkop', approximately 20 km SE of Sabie (–BB), *Deall* 1976 (PRE); SW corner of Ameide Farm (–DD), *Souza* 514 (PRE); Carolina District, Stolzburg syncline, Farm Groenvaly 701JT. (–DD), *Balkwill* 8170 (MO). **2531 (Komatipoort)**: 14 km from Barberton on Havelock road, Saddleback ridge (–CC), *Retief* 2107 (PRE); Barberton, summit Saddleback Mountains (–CC), *Galpin* 1312 (BOL); Havelock, Pigg's Peak (–CD), *Compton* 28709, 30649 (NBG, PRE). **2630 (Carolina)**: Amsterdam, Athole Farm (–DA), *Van Wyk* 2270 (PRE); Piet Retief, Vlakkloof Estate (–DC), *Sidney* 1662 (PRE). **2729 (Volkkrust)**: Graskop, mountain side on Old London Farm (–BB), *Galpin* 14434 (BOL, PRE); Volkkrust highlands (–BB), *Mogg* 7514 (PRE). KWA-ZULU NATAL: **2730 (Vryheid)**: North hill on margin of wooden ravine on SE slope (–AC), *Galpin* 10016 (PRE); Wakkerstroom, Oshoek (–AC), *Devenish* 635 (PRE). **2731 (Louwsberg)**: Emyati mountains (–CC), *Thode* 2965 (NBG); 7 miles (11 km) West of Ngome (–CD), *Codd* 9511 (MO), *Codd* 9587 (PRE). **2828 (Bethlehem)**: Witzieshoek (–DB), *Thode* 6307 (NBG); Royal Natal National Park, Mount-Aux Sources (–DB), *Steyn* 1057 (NBG, PRE); River bed at foot of Mount-Aux Sources (–DB), *Evans* 1355 (SAM). **2829 (Harrismith)**: near De Beers Pass (–AD), *Wood* 5968 (MO); Bergville, Cathedral Peak Forest Station (–BC), *Killick* 4060 (PRE); Seheletwane, 40 km NW of Bergville (–CA), *Meyer* 4949 (PRE); Olivier's Hoek, Little Switzerland, Farm Keswick (–CA), *Zeyde* 111 (NBG); Little Switzerland (–CB), *Anderson* 190 (PRE); Cathedral

Peak Forest Research Station (–CC), *Killick* 1502 (BOL, PRE); Cathedral Peak area, sides of Umkambonja Valley (–CC), *Levyms* 8253 (BOL); Cathedral Peak Nature Reserve, Mike's Pass (–CD), *Breytenbach* WB5066 (PRE); *MacOwen* 279, 3572 (BOL); Alexandria (–DA), *Rudatis* 1638 (MO). **2830 (Dundee)**: Pomeroy District, Jobskop, on summit plateau (–CA), *Venter* 1812 (NH, PRE); Utrecht (–CB), *Parkhouse s.n.* (NBG); Bergville, Hlolelo, The Cave (–DB), *L'Ange* 92 (NU). **2831 (Nkandla)**: Nkandla Forest Reserve (–CA), *Van Wyk* 7327 (NH); Ngoye (–DC), *Wood* 8513 (NBG). **2929 (Underberg)**: Giant's Castle (–AB), *Rycroft* 3227 (NBG); Mulangane, above Carter's Nek, Farm 'Surprise' (–BC), *Hilliard* 8234 (PRE); Cobham Forest Reserve, Upper Polela (–CB), *Hilliard and Burt* 12547 (PRE); Wintershoek (–CD), *Solomon* 46 (NU); Coleford Nature Reserve, on road to Bulwer (–CD), *Magoswana* 17 (NBG); 3 miles (5 km) from Donnybrook on Ixopo road (–DD), *Edwards* 3099 (NH, NU, PRE); Ixopo, Farm 'Lynn Avis' on road to Donnybrook (–DD), *Hilliard* 10,133 (NU). **2930 (Pietermaritzburg)**: Natal, Nottingham (–AC), *MacClear* 870 (MO, PRE); Greytown (–AC), *Wylie s.n.* (NH); 21 miles (34 km) from Howick on the road to Mount Alida, Karkloof range. (–AD), *Ross* 2086 (PRE); Greytown, De Rust (–BA), *Thode* 2961 (NBG); Greytown, upper slopes of mountain (–BA), *Galpin s.n.* (BOL); Near Richmond (–BD), *Wood* 9851 (BOL, PRE); Richmond (–CC), *Galpin* 12,017 (PRE); hill near Boston (–DA), *Wood* 4589 (PRE), *Galpin* 6698 (SAM); Inanda (–DB), *Wood* 1904 (BOL); Hammarsdale Area, Hector (Eskom) substation site (–DC), *Ward* 13,002 (NH, NU). **3029 (Kokstad)**: East Griqualand, 'Vielsalm' (–AC), *Forbes* 1138 (NH); Mount Currie (–AD), *District Forest Officer* 582 (PRE); summit Mount Currie (–AD), *Tyson* 1485 (NBG, SAM); Zuurburg mountain (–BC), *Long* 1247 (PRE); Zuurburg mountains near Kokstad (–BC), *Tyson* 1162 (BOL, SAM); Zuurburg (–BC), *Hilliard and Burt* 10,181 (NU); Mountains near Clydesdale (–BD), *Tyson* 2524, 1062, 2550, (BOL), *Tyson* 1062, 1260 (SAM); Umzimkulu, Farm 'Ebuta', Mount Malowe (–BD), *Hilliard and Burt* 11227 (NU); Kokstad (–BD), *Mogg* 4944 (PRE); Emyembe Forest (–CB), *Tyson* 1061 (SAM); Ntabankulu mountain (–CD), *Hilliard and Burt* 7347 (NU); Western end of contour path above Dollos Forest (–DA), *Brand, Swart and Abbott* 427 (MO); Ngele, below Eagles Nest (–DA), *Abbott* 5275 (NH); Harding, Farm 'Rooivaal' (–DB), *Hilliard and Burt* 16,738 (NU). **3030 (Port Shepstone)**: Ixopo, Sutton Estates (–AA), *Hilliard and Burt* 11,208 (NU); Umzinto, Ellesmere (–AD), *Hilliard and Burt* 14,527 (NU, PRE); Umgaye Flats, Friedenau (–BC), *Rudatis* 141 (NBG); Izotsha Falls view site (–CB), *Hilliard* 1915 (NU); Umtamvuna River Reserve (–CC), *Nicholson* 1756 (PRE). **3130 (Port Edward)**: Umtamvuna Nature Reserve, Bulolo (–AA), *Abbott* 3065, 3559 (NH). WESTERN CAPE: **3322 (Oudtshoorn)**: Kammanasie mountains, Farm Molen River, Manetjiesberg, south slopes stream off main ravine, above road (–DB), *Matthews* 1039 (NBG). EASTERN CAPE: **3028 (Matatiele)**: Naude's Nek Pass (–CA), *Bigalke* 212 (PRE); Buffalo Nek, about 10 miles (16 km) NW of Mount Frere, slopes of Umgano (–DD), *Lewis* 4655 (NBG). **3127 (Lady Frère)**: near top of Satana's Pass, 7 miles (11 km) north of Engcobo (–DB), *Lewis* 4656 (NBG). **3128 (Umtata)**: Maclear, Prentjiesberg, Farm Fontana, ± 20 km NW of Ugie on Mapassa's Nek Pass (–AA), *Bester* 2545, 2566 (NH); Farm Cromarty, west of Ugie (–AA), *Magoswana* 6 (NBG); Kokstad, St. Cuthberts (–BC), *Kelly s.n.* (NBG). **3129 (Port St. Johns)**: Nkanga near Zibungu (–AC), *Hutchings* 1011 (NU); Magwa Falls, 12 miles (19 km) from Lusikisiki (–BC), *Lewis s.n.* (NBG); Sakombe forest (–BD), *Edwards and Potgieter* 2829 (NU); Nqadu Forest Reserve, on edge of south-sloping ridge in tall grassland (–DA), *Bean and Viviers* 2313 (BOL). **3226 (Fort Beaufort)**: Katberg Pass, below pass on south side (–BC), *Bayer and Puttock* SAF 96232 (MO, PRE); Amatole Mountains, below Tor-Doone (–DB), *Phillipson* 1055 (MO). **3227 (Stutterheim)**: Summit of mountain above Toise River railway station (–AC), *Flanagan* 1894 (NBG); King William's Town Division, Kieskammahoek (–CA), *Goulimis* 22902 (BOL); Stutterheim, Dohne (–CB), *Sim* 19742 (NU). **3228 (Butterworth)**: Kentani [Centane] (–AD), *Pegler* 462 (BOL); Quora Mouth (–BC), *Strey* 11178 (NH, NU). **3323 (Willowmore)**: Die Hoek,

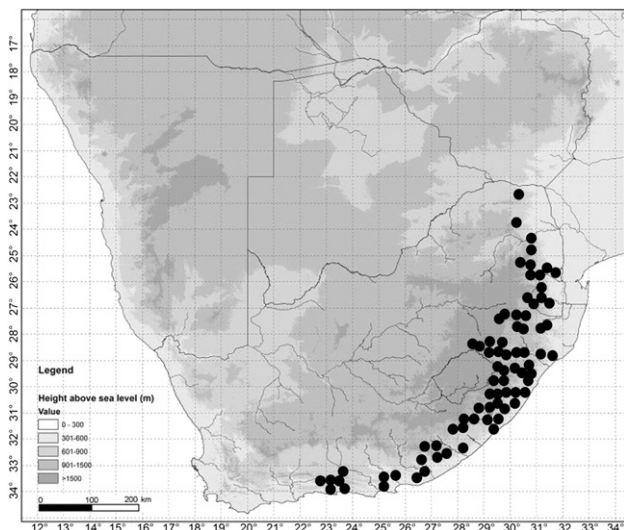


Fig. 7. Known distribution of *Inulanthera dregeana*.

N foot of Tsitsikamma mountains near Joubertina, Uniondale (–BD), *Esterhuysen* 19959 (BOL); Top of Prince Alfred's Pass (–CC), *Lavranos* 12921 (PRE); Edge of forest, Knysna (–CC), *Keet s.n.* (NBG); Many Waters Kloof, W of Lauterwater, Uniondale (–DC), *Compton* 5177 (BOL), 7128 (NBG); Die Hoek, N foot Tsitsikamma mountains, near Joubertina (–DC), *Esterhuysen* 16842 (BOL). **3325 (Port Elizabeth)**: Alfred district, Zuurberg (–BC), *Hilliard and Burt* 10,192 (NU, MO); Groendal Wilderness Reserve, District Uitenhage, Chase's Kloof (–CB), *Scharf* 1334 (PRE); Kromrivier, Uitenhage (–CC), *Drège* 161916 (SAM). **3326 (Grahamstown)**: Albany District, Nature Reserve, Grahamstown 3.9 miles (6 km) from town (–BC), *Booi s.n.* (PRE); in grassy slopes near Grahamstown (–BD), *MacOwan* 279 (MO). **Precise locality unknown**: Natal, *Cooper* 1062 (BOL); Natal, South Coast. *Sidey* 4207 (PRE).

Swaziland. **2631 (Mbabane)**: Forbes Reef (–AA), *Compton* 30,023 (NBG); Dalriach (–AC), *Dlamini s.n.* (PRE); Duiker Busch (–AC), *Compton* 25,700 (NBG, PRE); Millen's falls (–AC), *Compton* 25857 (NBG); Ukuthula (–AC), *Compton* 25021 (NBG); Stroma forest edge (–AC), *Compton* 25829 (NBG); The Caves, Black Mbuluzi valley (–BC), *Compton* 27466. (PRE), *Compton* 26801 (NBG); Hlathikulu (–CD), *Stewart* 138 (SAM).

4. *Inulanthera leucoclada* (DC.) Källersjö in Nord. J. Bot. 5 (6): 539 (1986). *Hymenolepis leucoclada* DC., Prodr. 6: 85 (1838). *Athanasia leucoclada* (DC.) Harv. in Fl. cap. 3: 19 (1865); Oliv. in Hooker's Icon Pl. 23: t. 2233 (1892); Hilliard, Compositae in Natal: 338 (1977). Type: South Africa, [Eastern Cape], between Umsikaba and Umzimvubu rivers, 16 May 1832, *Drège* 5039 (G-DC, holo. – image!; K – image!, P – image!, iso.)

Single-stemmed, reseeding shrub 0.30–1.5 m, stems simple or sparsely branched in upper half, branches 2–4 mm diam., densely whitish woolly, sometimes glabrescent. *Leaves* sub-erect to spreading, ovate to lanceolate, 5–40 × 5–10 mm, base cuneate, margins sharply serrate, glabrous, coriaceous; axillary shoots absent. *Capitula* in dense compound corymbs 25–40 mm across, branches 10–35 mm long, inflorescence bracts lanceolate, 5–10 × 2–5 mm. *Involucre* subglobose, 8–10 × 7–12 mm, puberulous or glabrous; outer bracts ovate, 2–5 × 1–2 mm, acuminate, margins serrulate. *Receptacle* paleate. *Florets* 60 to 70. *Pappus* formed by cypselas ribs extended apically into horns 0.2–0.3 mm long, sometimes broadly membranous or scale-like and ± connate basally. *Cypselas* obconic, 1–2 × 0.5–1.0 mm, prominently 8- to 10-ribbed, glabrous to slightly scabrid. **Fig. 8.**

Diagnostic characters

Inulanthera leucoclada is a distinctive species with virgate, densely whitish woolly stems (**Fig. 8A**) and ovate, closely serrate leaves without axillary leaf tufts. The relatively large heads, 7–10 mm long, contain 60 to 70 florets each. The pappus is formed by either horn-like extensions of the ribs or membranous scales. *Inulanthera leucoclada* is unique in the genus in its single-stemmed habit and reseeding fire survival strategy (resprouting in the other species of *Inulanthera*). These two fire survival strategies are common in fire-prone vegetation, particularly fynbos (**Cowling, 1987; Schutte et al., 1995; Manning and Goldblatt, 2005**). Herbarium field notes on several collections of *I. leucoclada* noted it as being locally frequent but we were unable to relocate the species in several

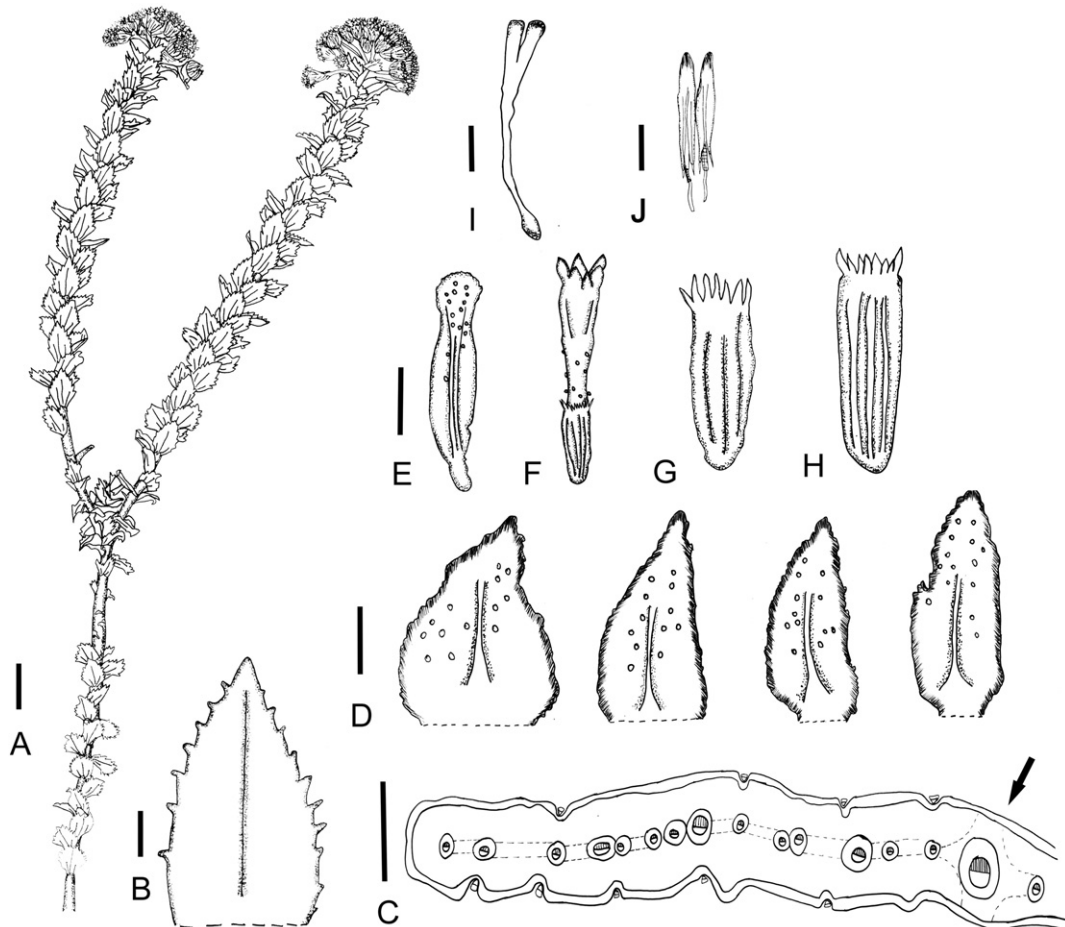


Fig. 8. *Inulanthera leucoclada*, *Rudalis* 164 (NBG). A. Flowering branch. B. Leaf. C. Leaf tissue plan (*Magee* 1098, (NBG)). D. Involucral bracts. E. Palae. F. Floret. G. Cypselas. H. Cypselas. I. Style. J. Anthers. Arrow indicates leaf midrib. Scales: A and B: 10 mm; C–I: 1 mm. Artist: S.L. Magoswana.

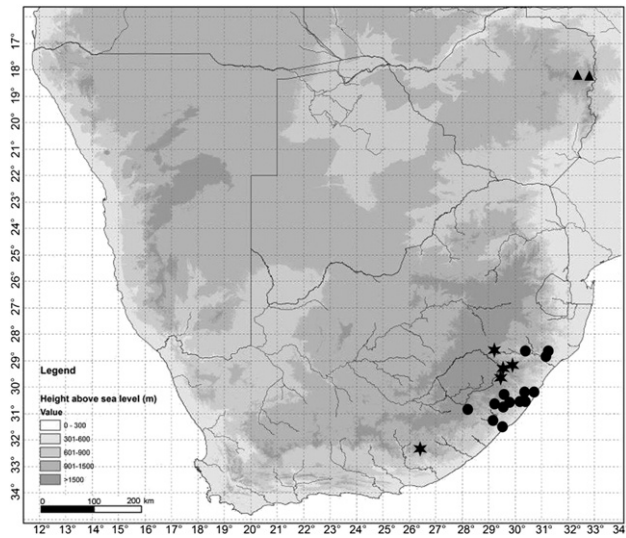


Fig. 9. Known distribution of *Inulanthera leucoclada* (circles), *I. montana* (stars) and *I. nuda* (triangles).

localities amongst older vegetation, presumably because the species is a relatively short-lived member of early successional stages after fire.

Distribution, ecology and phenology

This species ranges from Kokstad in the Eastern Cape through southern and central KwaZulu-Natal, in moist grassland and on forest margins at altitudes 350 m to above 1800 m (Fig. 9). Flowering is from January to May. The species is a short-lived element of earlier post-fire successional communities, and annual fires are likely to be detrimental to its survival.

Additional specimens examined

South Africa. KWA-ZULU NATAL: **2830 (Dundee)**: Hlolelo, 'The Cave' (–DB), *L'Ange* 37 (NU). **2929 (Underberg)**: Richmond, Hella-Hella (–DB), *Gibson s.n.* (NU); Hella-Hella road, S-facing slopes above Umkomaas (–DB), *Hilliard and Burt* 10324 (NU); Royal Natal National Park, MontAux- Sources (–DB), *Trauseld* 50 (NU); Royal Natal National Park, Tugela Gorge pathway, Tendeli (–DB), *Hilliard and Burt* 15391 (NU), *Schrire* 1695 (NH), *Hilliard* 2849 (NU), *Stewart* 2044 (NU); Tugela valley, Mont Aux- Sources, Natal (–DD), *Sim* 19015 (BOL, NU, PRE). **3030 (Port Shepstone)**: Friedenau, Umgai Flats (Alexandra Bay) (–BC), *Rudatis* 164 (NBG); Umtamvuma Nature Reserve (–CC),

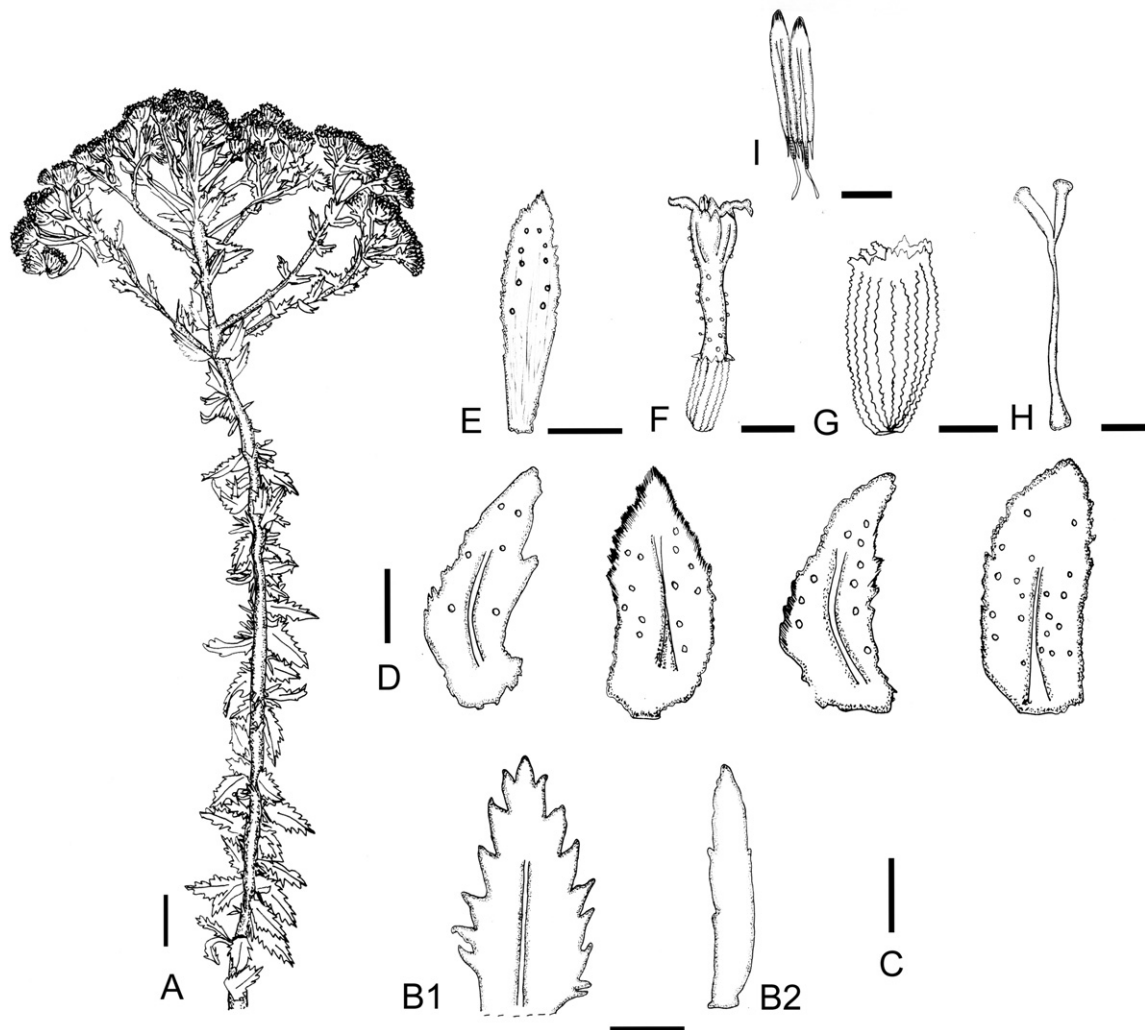


Fig. 10. *Inulanthera montana*, *Gibson s.n.* (NU). A. Flowering branch. B1 and B2. Leaf. C. Involucral bracts. D. Palae. E. Floret. F. Cypsela. G. Style. H. Anthers. Scales: A–B2: 10 mm; C–H: 1 mm. Artist: S.L. Magoswana.

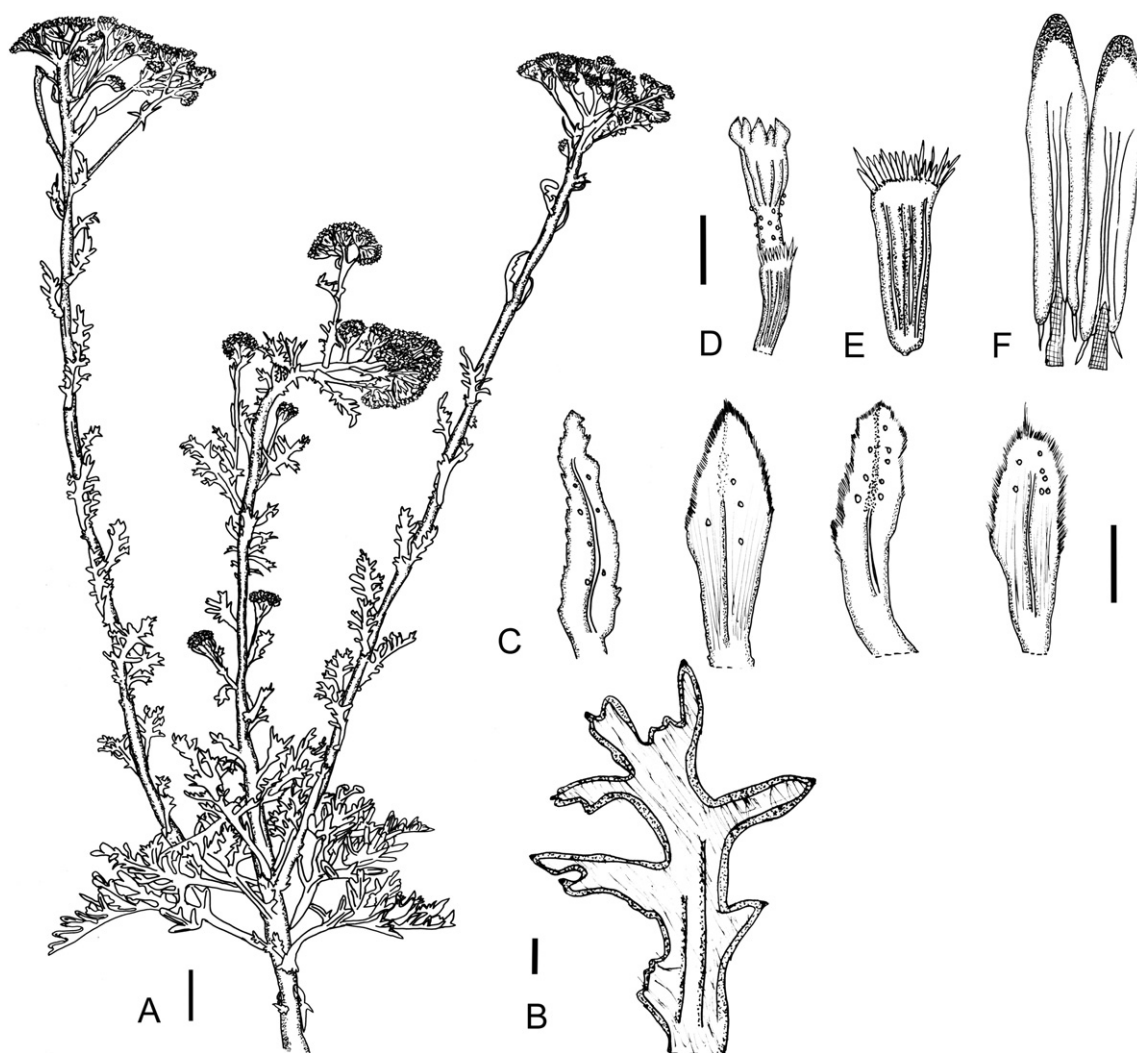


Fig. 11. *Inulanthera nuda*, Brain 6752 (MO). A. Flowering branch. B. Leaf. C. Involucral bracts. D. Floret. E. Cypseloid. F. Anthers. Scales: A and B: 10 mm; D–F: 1 mm. Artist: S.L. Magoswana.

Hilliard and Burt 10241 (MO, NU), Hilliard 6762 (NU), Abbott 1944, Strey 9869 (NH); above Umtamvuma River (–CD), Nicholson 1018 (PRE). EASTERN CAPE: **3028 (Matatiele)**: Farm Bernina, about 30 km (direct) NW from MacClear, Eland's Height (–CC), Bester 652 (NH). **3029 (Kokstad)**: Zuurberg mountains near Kokstad (–BC), Tyson 1185 (BOL, PRE, SAM); Zuurberg (–BC), Hilliard and Burt 10209 (MO, NU); Mount Malowe, near Clydesdale (–BD), Tyson 1059 (BOL, SAM), Tyson 2057 (BOL); S-facing slopes on bank above stream, just below waterfall, 0.7 km of Sugar Bush and 0.5 km N of National (Durban-Umtata) road (–CC), Steiner 1448 (NBG); Mount Insizwa (–CD), Hilliard and Burt 6556 (MO, NBG, NU), Magoswana 15 (NBG); Weza, Zuurberg (–DA), Hilliard and Burt 6556, Hilliard and Burt 8081 (NU); Harding, Bangani Forest, Ngele Nature Reserve (–DA), Abbott 6980 (NH); Ngeli slopes (–DB), Hilliard 1771 (NU). **3128 (Umtata)**: Mtentu River Gorge (–CD), Edwards 3246 (NU). **3129 (Port St. Johns)**: ± 10 km to Umkhambati Nature Reserve on road from Holy Cross (–BD), Magoswana 16 (NBG); Kambati waterfall (–DB), Strey 8673 (NU, PRE).

5. *Inulanthera montana* (Wood & Evans) Källersjö in Nord. J. Bot. 5 (6): 539 (1986). *Athanasia montana* Wood & Evans in Nat. Colon. Herb. Annual Rep. 10. (1900); Wood in J. Bot. 171 (1901); Hilliard, Compositae in Natal: 338 (1977). Type: South Africa, [KwaZulu-Natal], Drakensberg, source of Bushman's River, Jun. 1896, Evans 662 (NH, lecto. – image!, designated here; BOL!, K – image!, PRE – image! isolecto.).

Multi-stemmed shrub 0.30–1.0 m, resprouting from a woody caudex, stems simple or densely branched from near base, branches 2–6 mm diam., cobwebbed. Leaves sub-erect to spreading, lanceolate to obovate, 10–25 × 4–10 mm, base cuneate, margins sharply serrate, revolute, glabrous, coriaceous; axillary shoots developed in upper leaves. Capitula in dense compound corymbs 30–40 mm across, branches 5–20 mm long, inflorescence bracts linear to lanceolate, 2–10 × 3–5 mm. Involucre subglobose, 3–5 × 3–7 mm, glabrescent or glabrous; outer bracts ovate to elliptic, 2–3 × 1–2 mm, obtuse, margins serrulate. Receptacle paleate. Florets 40 to 50. Pappus formed by ribs extended apically into horns 0.1–0.3 mm long. Cypseloid obovoid, 1.5–2.0 × 0.5–1.0 mm, prominently 8- to 10-ribbed, scabrid. Fig. 10.

Diagnostic characters

Inulanthera montana can be confused with *I. leucoclada* because of its serrated leaves, but is distinguished by the low branching habit and conspicuous axillary shoots (Fig. 10A) and the smaller capitula 3–7 mm long containing 40 to 50 florets (vs. 7–10 mm long containing 60 to 70 florets).

Distribution, ecology and phenology

Inulanthera montana is known mainly from central KwaZulu-Natal, where it occurs on rocky slopes in grassland at altitudes above 1700 m,

with a single isolated early record from the Winterberg in Eastern Cape. Flowering is from May to July. (Fig. 9).

Additional specimens examined

South Africa. KWA-ZULU NATAL: **2829 (Harrismith)**: Cathedral Peak (–CC), *Schelte* 262 (NU), *Esterhuysen* 10,240 (BOL); Weenen Division, Cathedral Peak area, (–CC), *Esterhuysen* 15504 (BOL, NBG); **2929 (Underberg)**: Cathkin area, Drakensberg upper S slopes (–AB), *Esterhuysen* 7934 (BOL); Giant's Castle Game Reserve, Giant's Castle Pass (–AB), *Wright* 1010 (NU); slopes of Cathkin Peak (–AB), *Edwards* 2008 (NU), *Meebold* PRE 58477 (PRE); Bergville, Injasuti area, near Drakensberg (–AB), *Esterhuysen* 34966 (BOL); upper Loteni Valley, vicinity of Ash Cave (–AD), *Hilliard and Burt* 18,089 (NU); source of Bushman's River, Drakensberg (–BA), *Evans* 662 (BOL); Highmoor Forest Reserve, ridge SE of Giant's Castle, Headwaters of Elandshoek River (–BC), *Hilliard and Burt* 16235 (NU); Lion's Rover, Farm Allendale (–BC), *Hilliard and Burt* 11264 (NU); Kamberg (–BD), *Gibson s.n.* (NU). EASTERN CAPE: **3226 (Fort Beaufort)**: Great Winterberg (–AC), *Galpin* 2660 (BOL).

6. *Inulanthera nuda* Källersjö in Nord. J. Bot. 5 (6): 539 (1986), as a replacement name for *Pentzia schistostephioides* M.Taylor in Bull. Misc. Inform. Kew: 60 (1940) [not *Inulanthera schistostephioides* (Hiern.) Källersjö]. Type: Zimbabwe, Inyanga Downs, by water, 19 Oct. 1935, *Eyles* 8479 (K, holo. – image!; SRGH – image!, iso.).

Multi-stemmed shrub 0.80–2.0 m, resprouting from a woody caudex, stems simple or densely branched in upper half, branches 3–8 mm diam., densely grey to whitish woolly. *Leaves* sub-erect to spreading, ovate to lanceolate, 10–70 × 5–40 mm, pinnatisect to bipinnatisect, lobes 3 to 7, lanceolate to oblong, 2–5 mm long, base auriculate, margins revolute, densely felted, coriaceous; axillary shoots developed from upper leaves. *Capitula* in dense compound corymbs 45–65 mm across, primary branches 15–40 mm long, secondary branches 5–20 mm long, inflorescence bracts elliptic to lanceolate, 4–10 × 1–3 mm. *Involucre* campanulate to subglobose, 4–8 × 4–6 mm, pubescent to glabrescent; outer bracts elliptic, 2–4 × 0.5–1.0 mm, acuminate, margins serrulate. *Receptacle* epaleate. *Florets* 70 to 75. *Pappus* of scales, partially fused into a coroniform structure. *Cypselas* obconic, 1–2 × 0.5–1.0 mm, weakly 8- to 10-ribbed, glabrous. Fig. 11.

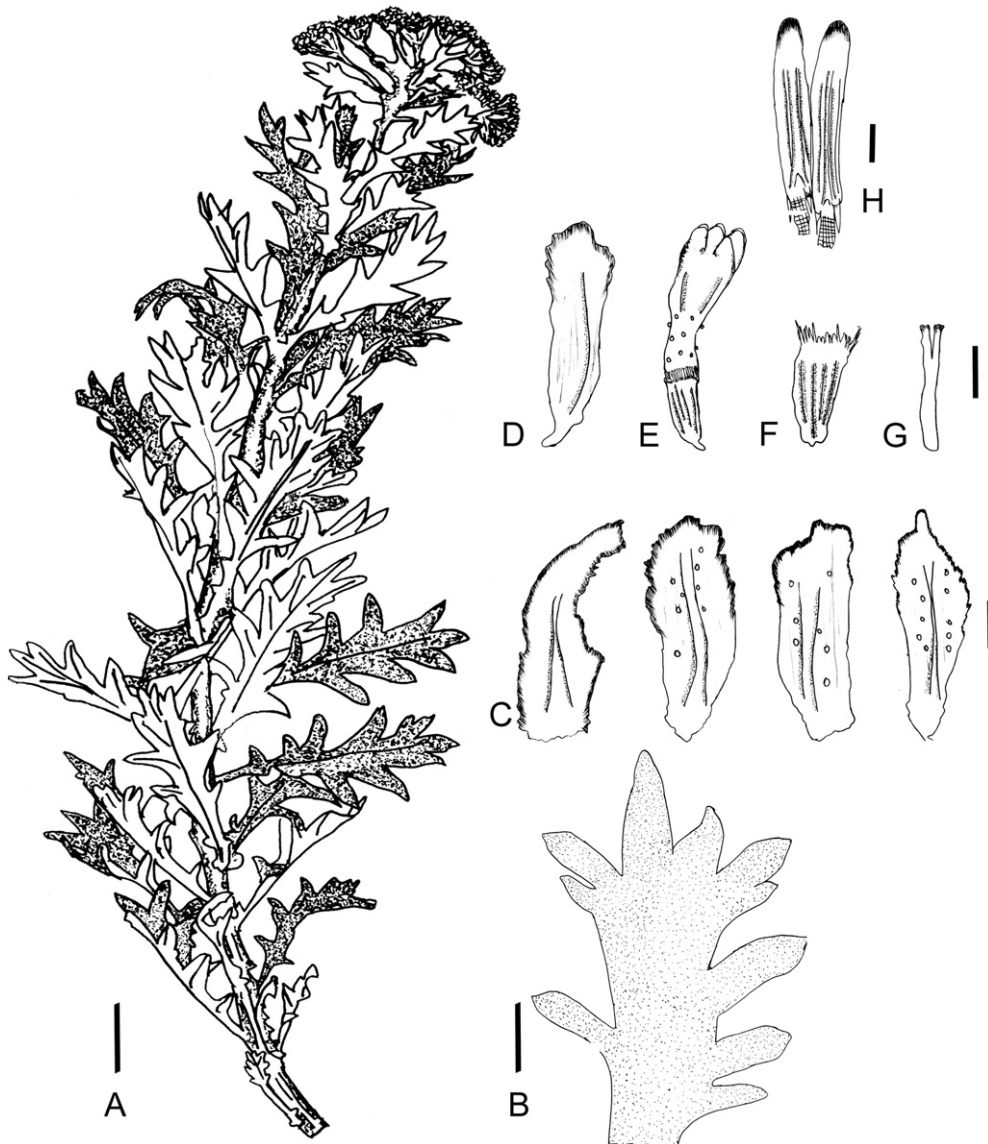


Fig. 12. *Inulanthera schistostephioides*, Huntley, Roberts and Ward 11 (PRE). A. Flowering branch. B. Leaf. C. Involucral bracts. D. Palae. E. Floret. F. Cypselas. G. Style. H. Anthers. Scales: A and B: 10 mm; C–H: 1 mm. Artist: S.L. Magoswana.

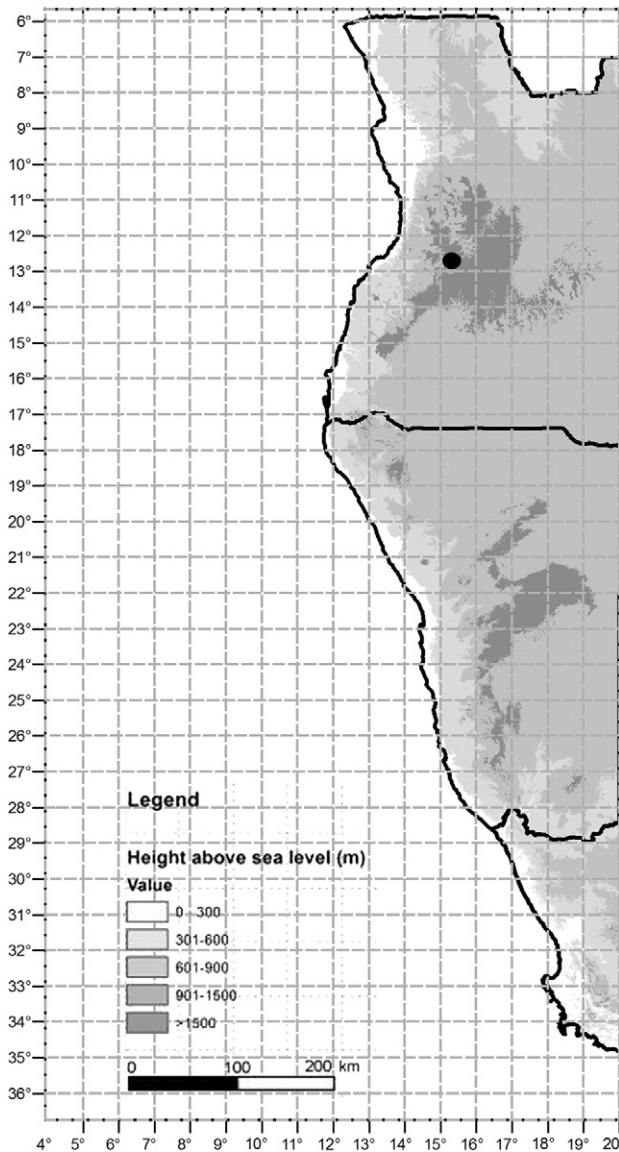


Fig. 13. Known distribution of *Inulanthera schistostephioides*.

Diagnostic characters

Inulanthera nuda is a distinctive species with large (>50 mm long) grey-woolly, pinnatisect to bi-pinnatisect leaves with strongly revolute margins (Fig. 11B) and an epaleate receptacle, unique in the genus.

Distribution, ecology and phenology

This poorly collected species is only known from Inyanga in Zimbabwe, where it occurs on mountain ridges above 2000 m (Fig. 9). The species flowers from September to November.

Additional specimens examined

Zimbabwe. **1832 (Mutare)**: Inyanga, Nyangani Farm (– AB), Chase 1899 (PRE). Inyanga, Pungwe Valley (– BA), Hopkins s.n. (PRE); Rhodes, Inyanga Estate (– BA), Brain 6752 (MO, PRE).

7. *Inulanthera schistostephioides* (Hiern.) Källersjö in Nord. J. Bot. 5 (6): 539 (1986). *Athanasia schistostephioides* Hiern. in Cat Afr. Pl.: 589. (1898). Type: Angola, Huila, in rocky shrubby places near Lopollo, Jan.

1960, Welwitch 3974 (BM, lecto., – image!, designated by Källersjö (1986); LISU – image!, isolecto.)

Multi-stemmed shrub 0.80–1.5 m, resprouting from a woody caudex, stems simple or sparsely branched in upper half, branches 2–4 mm diam., sparsely grey-felted becoming glabrous. Leaves sub-erect to spreading, obovate, 15–40 × 10–25 mm, pinnatisect, lobes 8 to 14, oblong, 3–10 mm long, base auriculate, margins revolute, discolorous, upper surface thinly cobwebbed, lower surface very densely woolly, coriaceous; axillary shoots absent. Capitula in dense compound corymbs 40–50 mm across, primary branches 15–30 mm long, secondary branches 3–8 mm long, inflorescence bracts elliptic to linear, 2–4 × 1–2 mm. Involucre campanulate to subglobose, 3–5 × 4–6 mm, pubescent when young, glabrescent; outer bracts lanceolate, 2–3 × 0.5–1 mm, obtuse, margins serrulate. Receptacle paleate. Florets 20 to 30. Pappus of scales, partially fused into a coroniform structure. Cypselas obovoid, 1–2 × 0.5–1 mm, prominently 8- to 10-ribbed, glabrous. Fig. 12.

Diagnostic characters

Inulanthera schistostephioides is readily distinguished by its pinnatisect, strongly discolorous leaves with the upper surface thinly cobwebbed and dark green in colour and the lower surface densely woolly and yellowish-beige in colour (Fig. 12B). The lobes are distinctly mucronulate.

Distribution, ecology and phenology

This species is endemic to Huila in Angola, occurring in grasslands and on forest margins at altitudes above 2000 m (Fig. 13). Flowering time is from December to January.

Additional specimens examined

Angola. **1215 (Huambo)**: Huambo, Mount Moco (– CD), Huntley, Roberts and Ward 11 (PRE).

8. *Inulanthera thodei* (Bolos) Källersjö in Nord. J. Bot. 5 (6): 539 (1986). *Athanasia thodei* Bolus in Trans. S. Afri. Phil. Soc. 16:387 (1906); Hilliard, Compositae in Natal: 338 (1977). Type: South Africa, [KwaZulu-Natal], stony places near the summit of MontAux-Sources, Jan. 1896, Thode 23 (BOL! lecto., designated here; K – image!, isolecto.). [Syntype: South Africa, [Eastern Cape], Cape colony; district Barkly East, Doodman's-krantz Mt., [without date], Galpin 6707 (BOL). Note: The Thode collection at BOL is selected as lectotype as being determined in the author's handwriting as "Typus auctoris!"]

Multi-stemmed shrub up to 0.40–1.5 m, resprouting from a woody caudex, stems simple to densely branched in upper half, branches 4–7 mm diam., densely woolly to glabrous. Leaves sub-erect to spreading, linear, 10–45 × 2–3 mm, simple to trifid, lobes linear, 5–10 mm long, base cuneate, margins strongly revolute, densely whitish woolly, sometimes glabrescent, coriaceous; axillary shoots absent. Capitula in dense compound corymbs 20–40 mm across, branches 5–15 mm long, inflorescence bracts narrowly lanceolate, 5–10 × 1–2 mm. Involucre campanulate, 3–5 × 4–7 mm, cobwebby; outer bracts elliptic to lanceolate, 2–3 × 0.5–1.0 mm, acuminate, margins serrulate. Receptacle paleate. Florets 65 to 70. Pappus formed by cypselas ribs extended apically into horns 0.1–0.2 mm long. Cypselas obovoid, 1–2 × 0.5–1.0 mm, prominently 8- to 10-ribbed, glabrous. Fig. 14.

Diagnostic characters

Inulanthera thodei is distinguished by its much-branched habit and linear or deeply 2- or 3-lobed leaves without axillary tufts (Fig. 14A–B2). The leaves are glabrous above but pubescent beneath with whip-like eglandular hairs in the grooves formed between the midrib and revolute

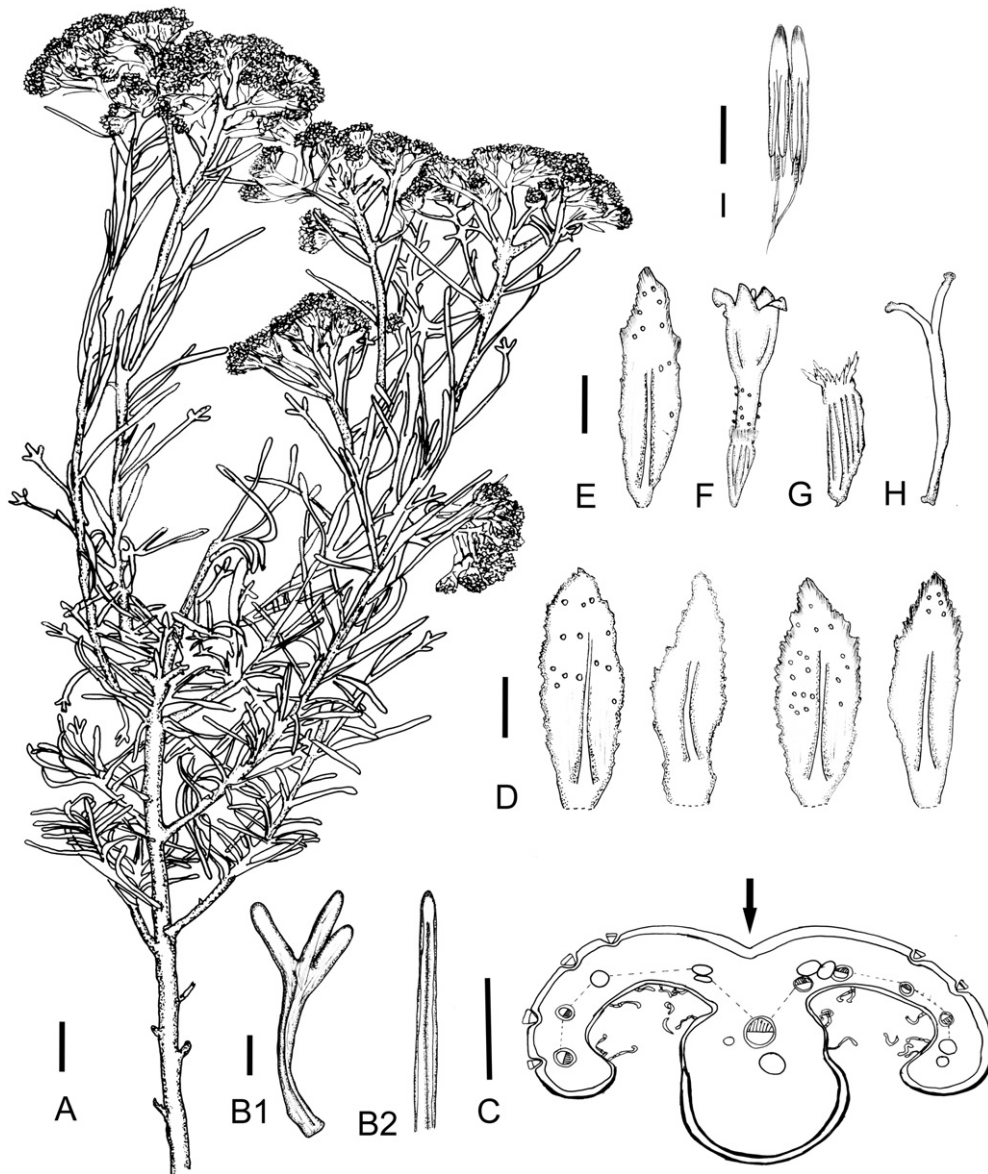


Fig. 14. *Inulanthera thodei*, Killick 4475 (NH). A. Flowering branch; B1 and B2. Leaf. C. Leaf tissue plan (Magee 1087, (NBG)). D. Involucral bracts. E. Palae. F. Floret. G. Cypsel. H. Style. I. Anthers. Arrow indicates midrib. Scales: A–B2: 10 mm; C–H: 1 mm. Artist: S.L. Magoswana.

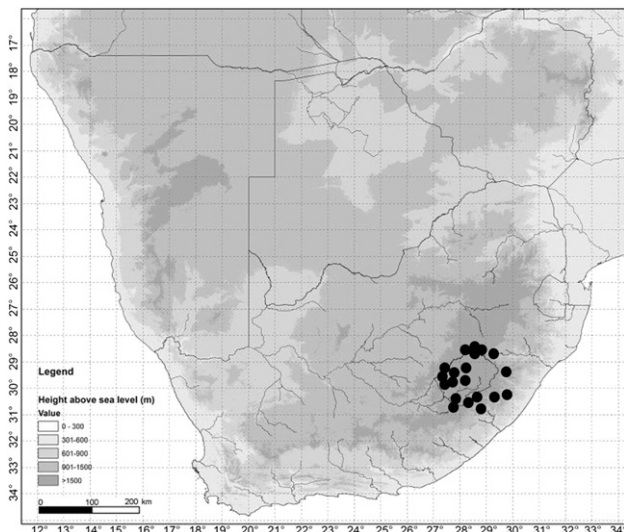


Fig. 15. Known distribution of *Inulanthera thodei*.

margins. Anatomical investigation reveals the presence of resin canals in the mesophyll.

Distribution, ecology and phenology

This species is a high-altitude endemic of the Drakensberg Mountains, ranging from the northern parts of the Eastern Cape through KwaZulu-Natal and Lesotho, at altitudes above 2000 m, on basalt slopes along streams and drainage lines in montane scrub (Fig. 15). The species flowers in March and April.

Inulanthera thodei has been reported to be used to fumigate huts after someone has died and is known by the following Sotho vernacular names; *kgato*, *ledingwana* and *sehalahala se seputswa* (Moffett, 2010).

Additional specimens examined

South Africa. KWA-ZULU NATAL: **2829 (Harrismith)**: Bergville, Drakensberg (–CB), *Esterhuysen 27817* (BOL). **2929 (Underberg)**: Moraine, catchment of south branch of Loteni river (–BC), *Wright 850* (NU). EASTERN CAPE: **3027 (Lady Grey)**: lower south facing slopes of

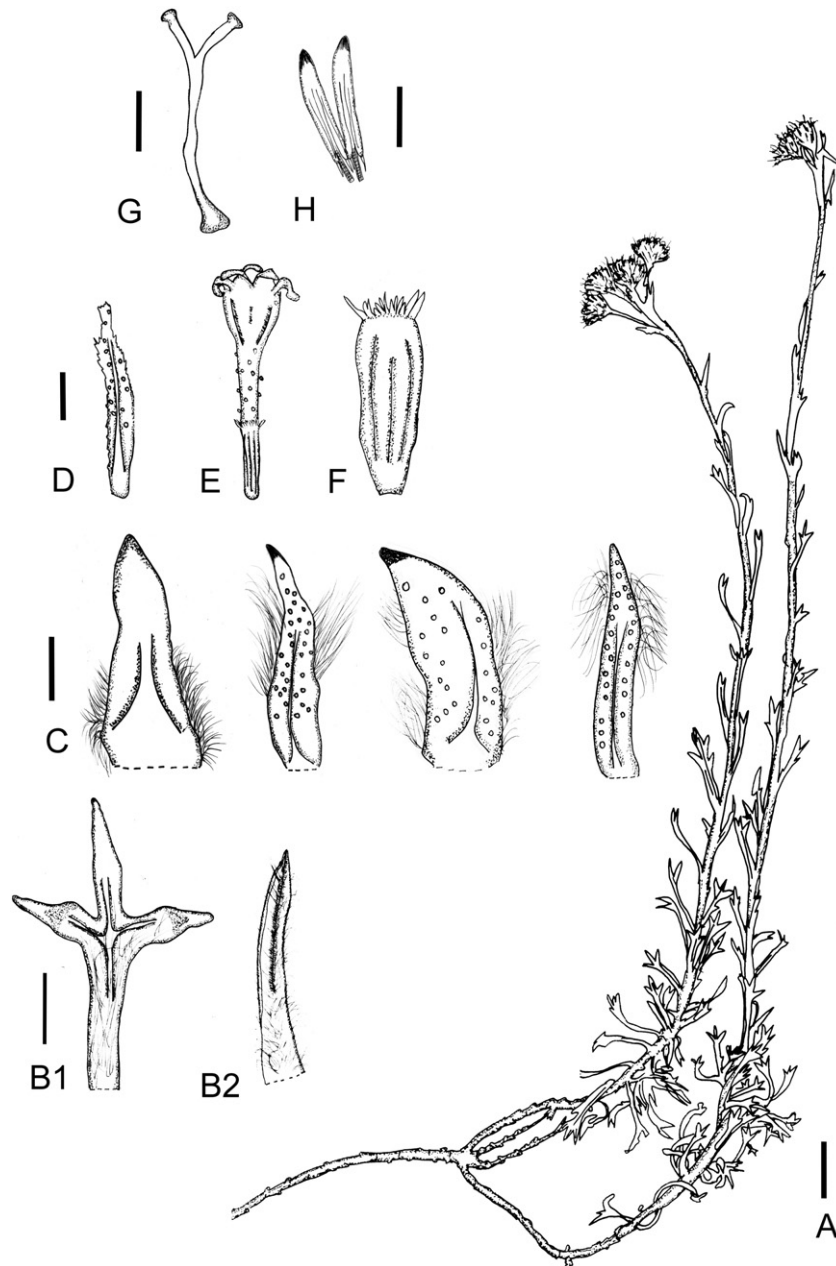


Fig. 16. *Inulanthera tridens*, Hoener 2192 (MO). A. Flowering branch. B1 and B. Leaf. C. Involucral bracts. D. Palae. E. Floret. F. Cypsel. G. Style. H. Anthers. Scales: A–B2: 10 mm; C–H: 1 mm. Artist: S.L. Magoswana.

Mount Ben Macdhui (–DB), Roux 1162 (NBG), Hilliard and Burt 16,421 (MO, NU); Mount Ben Macdhui north of Rhodes, alongside road at foot of mountain (–DB), Matthews 822 (NBG). **3028 (Matatiele)**: ascent to Naude's Nek (–CA), Hilliard and Burt 6611 (MO, NBG, NU), Hilliard 3933 (BOL, NU, NH), Magoswana 9 (NBG); Barkly East, Drakensberg mountains (–CA), Galpin 6707 (BOL); Naude's Nek Pass (–CA), Bester 2374 (NH), Zietsman and Zietsman 1475 (PRE); Farm Bernina, about 30 km (direct) NW from Maclear, Elands Height (–CA), Bester 652 (NH); summit of Drakensberg beyond Naude's Nek (–DC), Hilliard 3933 (NH). **3029 (Kokstad)**: summit of Mount Currie (–AD), Tyson 1450 (BOL). **3127 (Lady Frere)**: Fetcani Pass (–BB), Hilliard and Burt 12,330 (NU).

Lesotho. **2828 (Bethlehem)**: Maluti Mountains, 3 km from Oxbow Lodge to Butha-Buthe (–CC), Wright 1125 (MO); Botha-Botha District, Mota's Pass (–DA), Coetzee 373 (NBG); Mount-Aux-Sources area, Sinyati Gully (–DB), Esterhuysen 21,684 (BOL); summit of Mount-Aux-Sources (–DB) Galpin s.n. (BOL), Thode 6259, 6319, 7722 (NBG);

5 km from New Oxbow Inn on road leading south (–DC), Killick 4494 (MO), Killick 4496 (MO, PRE); 3 km from New Oxbow Inn on road to Moteng Pass (–DC), Killick 4475 (MO, NH, PRE); Butha-Buthe, Oxbow camp (–DC), Lubke 252 (PRE); Butha-Buthe, Tselenjane Valley (–DC), Roberts 3608 (PRE); Oxbow (–DC), Phillips s.n. (NU); Maluti Mountains, 3 km from Oxbow Lodge to Butha-Buthe (–DC), Panagos 15 (NH). **2927 (Maseru)**: 46 km from Mokhotlong on road to Sani top (–AC), Killick 4581 (PRE); Sehlabathebe National Park (–AC), Hoener 1744 (PRE); summit of Drakensberg near Giant's Castle Pass (–AD), Wright 1125 (NU, MO, PRE); Blue Mountain Pass (–BD), Hilliard and Burt 12,108 (NU); 5 km from top of Kotisephola Pass to Sani (–CA), Killick 4595 (NH); Black Mountains (–CA), Hilliard and Burt 8781 (NU); Sani Pass (–CB), Hilliard 8120 (NU); Sehlabathebe Reserve (–CC), Bayliss 50 (MO); Guillardmod, Getliffe and Mzamane 237 (MO); Bushman's Nek, Thamatuwe Pass (–CC), Hilliard and Burt 8969 (NU, PRE), Bayliss 1297 (PRE), Matthews 968 (NBG), Hoener 1744 (NU); plateau near summit of Bushman's River Pass (–CC), Wright 499

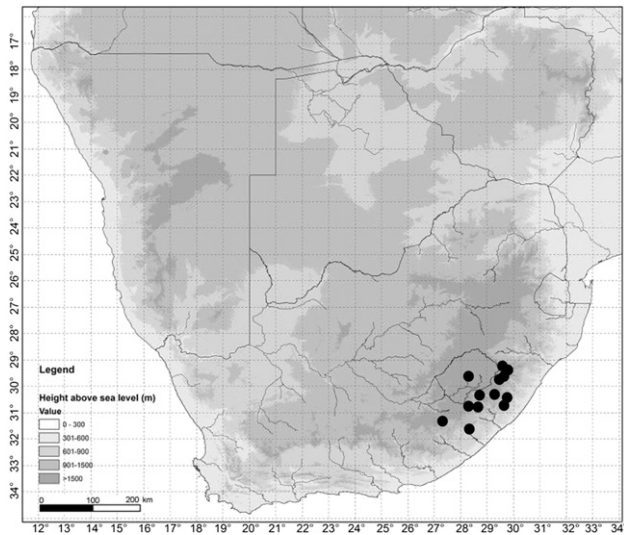


Fig. 17. Known distribution of *Inulanthera tridens*.

(NU). Maskachane near Zebra Nek (–CD), *Galpin s.n.* (BOL), *Galpin 13900* (PRE). Thaba-Putsoa (–DB), *Jacot-Guillarmod 1802* (PRE). **2928 (Marakabies)**: plateau near summit of Bushman's River Pass (–AA), *Wright 499* (NH); ± 30 km from Semonkong on road to Maseru (–CC), *Roux 2755* (NBG).

9. *Inulanthera tridens* (Oliv.) Källersjö in Nord. J. Bot. 5 (6): 539 (1986). *Athanasia tridens* Oliv. in Hooker's icon. Pl. 23: t. 2232; Hilliard, Compositae in Natal: 338 (1977). Type: South Africa: [KwaZulu-Natal], hills near Blinkwater, 21 Apr. 1890, *Wood 4315* (K, holo. – image!; BM – image!, BOL – image, E – image!, NH – image!, PRE – image, iso.).

Multi-stemmed shrub 0.45–1.0 m, resprouting from a woody caudex, stems simple or densely branched from near base, branches 2–4 mm diam., densely grey woolly. *Leaves*, sub-erect to spreading, narrowly oblong to elliptic, 15–25 \times 2–5 mm, simple to trifid or rarely 4-lobed, lobes lanceolate, 3–6 mm long, base auriculate, margins revolute, grey woolly sometimes glabrescent, coriaceous; axillary shoots absent. *Capitula* in dense compound corymbs 15–60 mm across, branches 15–40 mm long, inflorescence bracts linear to lanceolate, 5–10 \times 1–3 mm. *Involucre* subglobose, 5–8 \times 10–15 mm, densely whitish woolly; outer bracts ovate, 2–3 \times 1–2 mm, attenuate, with dark markings apically, margins minutely serrulate. *Receptacle* paleate. *Florets* 30 to 75. *Pappus* of ribs extended apically into horns 0.2–0.3 mm long. *Cypselas* obovoid, 1–2 \times 0.3–1.0 mm, prominently 8- to 10-ribbed, glabrous or sometimes with sessile glands between ribs. Fig. 16.

Diagnostic characters

Inulanthera tridens is distinctive in its entire or 3(4)-lobed leaves without axillary tufts (Fig. 16B1–B2) and attenuate involucre bracts with dark apices (Fig. 16C).

Distribution, ecology and phenology

This species is known from the Eastern Cape to KwaZulu-Natal and southern Lesotho, where it occurs on rocky mountain ridges at altitudes above 2000 m (Fig. 17). The species flowers in March and April.

Additional specimens examined.

South Africa. KWA-ZULU NATAL: **2929 (Underberg)**: Mount Erskine (–AA), *Wright 480* (NU); Ndedema area, Drakensberg (–AB), *Esterhuysen 22977* (BOL); Injasuti area, Drakensberg kloof (–AB), *Esterhuysen 20241* (BOL); Giant's Castle Game Reserve, contour path

to Bannerman (–AB), *Trauseld 752* (NU); right branch of Loteni River facing upstream (–AD), *Wright 172* (NU); Mpendle, Highmoor Forest Reserve, ridge SE of Giant's Castle, headwaters of Elandshoek River (–BC), *Hilliard and Burt 16211* (NU); Mpendle, Mulangane ridge, above Carter's Nek (–BC), *Hilliard and Burt 18352* (NU); Kamberg (–BD), *Wright 1773* (NU); Cobham, upper Polela (–CB), *Hilliard and Burt 12546* (NU, PRE). **2930 (Pietermaritzburg)**: Mount Gilboa (–AD), *Edwards 2786* (NU). EASTERN CAPE: **3028 (Matatiele)**: ascent to Nuade's Nek (–BC), *Hilliard and Burt 6616* (NU); summit Naude's Nek (–CA), *Hilliard 3909* (BOL, NH, NU) *Hilliard and Burt 16,607* (NU), *Bigalke 212* (PRE), *Magoswana 12* (NBG); Mount Fletcher, Ncome at summit of pass along road to Maxagweni (–DA), *Cloete 989* (NH). **3029 (Kokstad)**: summit of Mount Currie (–AD), *Tyson 1450* (SAM); Mount Insizwa (–BC), *Hilliard and Burt 6539* (NU); Ngele, below Eagles Nest (–DA), *Abbott 5270 A* (NH). **3127 (Lady Frere)**: Saalboom Nek, S of Clifford (–AB), *Hilliard and Burt 12279* (NU). **3128 (Umtata)**: Baziya Mountain (–CB), *Hilliard and Burt 13886* (NU). Lesotho: **2927 (Maseru)**: Sehlabathebe National Park, Matša a Mafikeng (–CC), *Hoener 2192* (MO).

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