A taxonomic revision of the recircumscribed South African endemic genus *Dasispermum* Raf. is presented, including keys to the species, complete nomenclature, typifications, descriptions, and geographical distributions. In addition, two new species, *D. grandicarpum* Magee & B.-E. van Wyk and *D. perennans* Magee & B.-E. van Wyk, are described. Seven species of *Dasispermum* are now recognised and can be distinguished from one another by their habit (life history and growth form), leaf morphology (leaf texture, leaf colour and width of the ultimate leaflet segments), inflorescence structure (length of the peduncle, presence or absence and division of involucral and involucel bracts), fruit morphology (relative length of the styles, fruit size and the prominence and relative orientation of the ribs) and fruit anatomy (shape of the cells external to the vittae).

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**Keywords:** Apiaceae; *Dasispermum*; New species; *Sonderina*; South Africa; *Stoibrax*; Taxonomy

### 1. Introduction

The circumscription of the genus *Dasispermum* Raf. was expanded by Magee et al. (2009b) to include five species previously treated as *Sonderina* H.Wolff as well as the only South African species of *Stoibrax* Raf., namely *S. capense* (Lam.) B.L. Burtt. As a result, this previously monotypic genus now comprises seven South African endemic species, two of which (*Dasispermum* sp. 1 and *D. sp. 2) were undescribed at the time and are here formalised as *D. perennans* Magee & B.-E. van Wyk and *D. grandicarpum* Magee & B.-E. Van Wyk respectively.

This conclusion resulted from a thorough taxonomic study of *Dasispermum* and related genera using molecular, morphological and anatomical data (Magee et al., 2009b). The geographically disjunct *Stoibrax* was shown to be polyphyletic, with the type of the genus from North Africa placed within the tribe Apioideae and the only South African species embedded within the genus *Sonderina*. Such a treatment was proposed by Adamson (1939) who considered *Sonderina hispida* (Thunb.) H. Wolff and *Stoibrax capense* to be closely related (as did Sonder, 1862). Furthermore, *Sonderina* was rendered paraphyletic by the inclusion of *Dasispermum suffruticosum* (Berg.) B.L.Burtt, which was strongly allied to a clade including *Sonderina hispida* and *Sonderina* sp. 1 (described here as *D. perennans*).

*Dasispermum* s.s. is traditionally defined by the succulent or semi-succulent leaves and often winged fruit, both of which were argued by Magee et al. (2009b) to be adaptations to the harsh littoral conditions in which this species occurs. Leaf succulence and rolled margins are both common halophytic adaptations (Mucina et al., 2006b). Based on the results of phylogenetic analyses of separate and combined molecular and morphological data (Magee et al., 2009b), an expanded *Dasispermum* s.l. was strongly supported as part of the *Capnophyllum* group (together with the Cape endemic genera *Capnophyllum* Gaertn. and *Scaraboides* Magee & B.-E. van Wyk) within the *Lefebvrea* clade of the tribe Tordylieae. The genus, in its new circumscription, can be distinguished from all other genera within the *Lefebvrea* clade by a combination of characters, namely the sympodial growth habit (resulting in leaf-opposed umbels), papillose petals, isodiametric...
fruit with the median and/or lateral ribs as prominent as the marginal ribs, the narrow commissure extending, at most, to the base of each rib, and the presence of square or radially elongated (upright) cells external to the vitae of the fruit.

2. Materials and methods

The complete collections of Dasispermum from the following herbaria were studied: BM, BOL, JRAU, K, LE, MO, NBG (including SAM and STE), PRE and S. This information was supplemented by extensive field work of almost all the taxa throughout much of their known geographical distributions. The recorded distribution of each species was verified and mapped using this material, together with geographical information from Leistner and Morris (1976). The species are arranged in the taxonomic treatment according to phylogenetic results recovered by Magee et al. (2009b) in the combined analysis. FAA and rehydrated herbarium material were used to study the fruit anatomy. This material was treated according to a slight modification of the method of Feder and O’Brien (1968) for embedding in glycol methacrylate (GMA), involving a final infiltration of the material in GMA for five days. Transverse sections, about 3 μm thick, were made using a Porter-Blüm ultramicrotome and stained using the periodic acid Schiff/toluidine blue (PAS/TB) method of Feder and O’Brien (1968).


3. Results and discussion

3.1. Vegetative morphology

The species of Dasispermum, with the exception of D. grandicarpum, exhibit a sympodial growth habit as found in the other taxa of the Capnophyllum group. Dasispermum suffruticosum and D. perennans differ in being short-lived suffrutescent with a permanent, slightly woody stem (Fig. 1a–e) — the others are all annuals. The young plants of both these species have an erect, only slightly branched habit but become well-branched and sprawling due to sprouting and subsequent seasonal growth from the nodes of the main stem. Dasispermum hispidum and D. capense can often be distinguished from one another by their habit. In D. hispidum (as in D. humile and D. tenue) the branches are usually erect to ascending or somewhat sprawling, while in D. capense they are almost always decumbent or prostrate (Fig. 1f), although exceptions to this have been recorded. Due to a great deal of ambiguity regarding the concepts of many of the species, the herbarium records and previous treatments of the South African flora (Goldblatt and Manning, 2000; Mucina et al., 2006a) have consistently misidentified small forms of Dasispermum hispidum, particularly in the Northern Cape Province, as D. tenue. Although D. tenue is indeed a relatively small herb (Fig. 1g), all of the species of Dasispermum exhibit considerable variation in the size of the mature plants depending on environmental factors. The herbaceous stems are conspicuously purple-blotched in D. grandicarpum, while in the other species they are immaculate (green, glaucous or reddish in colour). The littoral D. suffruticosum is easily distinguished from the other species by the usually firm and semi-succulent leaves with the ultimate leaflet segments curled inwards (Fig. 1b). The ultimate leaflet segments of the other species are herbaceous or coriaceous (Fig. 1c–g) and usually less than 1 mm broad, except in D. humile where they are diagnostically broader and ≥2 mm wide.

3.2. Reproductive morphology

The umbels of all the species except D. grandicarpum are leaf-opposed due to the sympodial growth habit, as is also found in Capnophyllum and Scaraboides (Magee et al., 2009a,b). In contrast, the main axis of D. grandicarpum appears to have monopodial growth which terminates in a primary umbel. Dasispermum tenue is most easily distinguished from the other species by the consistently sessile or subsessile umbels (Fig. 1g). While subsessile umbels may occur in the other species, particularly in the closely related D. humile, only in D. tenue are all of the umbels borne on a peduncle less than 4 mm long. The presence or absence of involucral and involucel bracts, a character emphasised in the treatment of Wolff (1927), as well as their division and texture, are useful diagnostic characters. Involucral bracts are almost always absent in D. humile and D. tenue, as well as the involucel bracts in the latter species. In D. capense, D. hispidum and D. perennans at least one of the involucral bracts is often pinnately divided and thus resembles the leaves. Similarly, the involucral and involucel bracts of D. suffruticosum share the somewhat succulent texture typical of the leaves of this species. Unlike the species of Capnophyllum, the rays and raylets of Dasispermum are generally scabrid and not glabrous (Magee et al., 2009a).

The flowers are similar in all the species: white and diagnostically with a papillose surface sculpturing, as found in most of the species of the Capnophyllum group (except Dasispermum suffruticosum and Scaraboides manningii Magee & B.-E. van Wyk). This character was reconstructed as either a synapomorphy for the Capnophyllum group, with reversals in Scaraboides manningii and Dasispermum suffruticosum, or as a convergent character supporting both Capnophyllum and Dasispermum s.l., with a reversal in Dasispermum suffruticosum (Magee et al., 2009b). The species of Dasispermum generally have a deeply emarginate petal apex which is a useful distinguishing floral character when compared to the usually truncate apices found in the genus Capnophyllum. Dasispermum tenue, however, differs from the other species in the generally smaller petals with truncate to only slightly emarginate apices. As in Capnophyllum, the styles of all the species are at first erect and short, but often
lengthen and become reflexed as the fruit mature. In most of the species, the styles usually extend beyond the base of the stylopodium and in *D. capense* may often extend well beyond the base of the fruit. Only in *D. tenue* do they remain short, becoming reflexed and extending at most to near the base of the stylopodium.

The size and shape of the fruit (Fig. 2) are important diagnostic characters. *Dasispermum grandicarpum* (Fig. 2f) and often *D. suffruticosum* (Fig. 2g) have relatively large fruit that are ≥4 mm in length, although those of *D. suffruticosum* may be much smaller (Fig. 2g2). *Dasispermum capense* (Fig. 2d) has the smallest fruit, not much larger than the ovary at maturity. In this species the fruit bulge dorsally outwards so that in lateral view they are broader than long with a prominently cordate base. Although the fruit of *D. hispidum* (Fig. 2c) may occasionally almost approach those of *D. capense* in shape, becoming broadly ovate, they are never broader than long. Furthermore, *D. capense* is easily distinguished from the other species, including *D. hispidum*, by the strongly concave appearance of the marginal ribs in lateral view. The two ribs are widely separated from one another, while in all the other species they are close together and parallel, or at most only very slightly

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Fig. 1. The diversity in habit found amongst the species of *Dasispermum*. The habit varies from short-lived perennial suffrutes, as in *D. suffruticosum* (a, b) and *D. perennans* (c–e), to annuals, as in *D. capense* (f) and *D. tenue* (g). Photographs taken by A.R. Magee except (a) by Ms M.M. le Roux and (g) by Mrs A. le Roux.
concave, and separated from one another. The ribs are usually cartilaginous and only slightly prominent, except in *D. suffruticosum* (Figs. 2g and 3g) where they are corky (at least before desiccation of the fruit) and either very prominent or more usually extending into broad wings. In *D. grandicarpum* (Fig. 2f), *D. humile* (Fig. 2b) and *D. tenue* (Fig. 2a) the ribs have a prominent fibrous ridge on the dorsal surface that is not present in the other species. The fruit are glabrous to only very slightly scabrid in *D. grandicarpum*, *D. humile*, *D. suffruticosum* and *D. tenue*. In *D. capense* (Fig. 2d) they may be scabrid to pustulate, while in *D. hispidum* (Fig. 2e) the fruit may be slightly scabrid to densely pilose. Traditionally, *Sonderina caruifolium* was largely distinguished from *S. hispida* by the glabrous as opposed to hispid or pilose fruit. However, after extensive field studies of these species throughout their range, it was observed that this character varied considerably even within populations. As a result, Magee et al. (2009b) treated *Sonderina caruifolium* as a synonym of *Dasiphrum hispidum*.

In transverse section the fruit of *Dasiphrum* (Fig. 3a–g) are isodiametric and either homomericarpic, as in *D. capense* (Fig. 3e), *D. grandicarpum* (Fig. 3f), *D. hispidum* (Fig. 3d), *D. humile* (Fig. 3c), *D. perennans* (Fig. 3b) and *D. tenue* (Fig. 3g), or often heteromericarpic as in *D. suffruticosum* (Fig. 3a1, a2). As mentioned in Magee et al. (2009b), one of the diagnostic characters for the genus is that the median and/or lateral ribs are ± as well developed as the marginal ribs. In all the species there are two commissural and four vallecular vittae. The cells external to both the commissural and vallecular vittae are prominent and
either square (Fig. 4c–g) or radially elongated (Fig. 4a–b), forming a distinct layer. This layer of square or radially elongated cells around the vittae is a distinct generic apomorphy for an expanded Dasispermum s.l. (Magee et al., 2009b). The cells around the vittae of D. capense (Fig. 4f), D. grandicarpum (Fig. 4g), D. perennans (Fig. 4c) and D. suffruticosum (Fig. 4d) are square, while those in D. humile (Fig. 4a) and D. tenue (Fig. 4b) are radially elongated. Those of D. tenue are the most prominent as they are enlarged and usually composed of two or three layers of radially elongated cells. Unfortunately, this character is not always visible in rehydrated fruit. The commissure is narrow and does not extend beyond the base of the marginal ribs. All other genera within the Lefebvrea clade have a broad commissure which extends well beyond the base of the marginal ribs and often to their tips.

4. Taxonomic treatment

4.1. Dasispermum


Erect to sprawling or prostrate, sympodial or rarely monopodial annual or short-lived perennial herbs or suffrutesces, 0.03–0.8 m tall. Stems herbaceous or permanent and woody, immaclate or sometimes purple-blotched, simple to well-branched; branches erect to decumbent or prostrate, sometimes sprouting at the nodes. Leaves cauline, 15–120 × 6–50 mm, becoming smaller acropetally, glabrous or scabrid, pinnate to 2-pinnate, herbaceous to coriaceous or firm and semi-succulent; ultimate leaflet segments linear-oblong to oblong, laminate to suberete or turgid, sometimes strongly involute (curled inwards), colorless or discolorous, green or glaucous, apex acute to obtuse, margins entire or toothed, venation...
visible or obscure. Petioles 5–60 mm long, basally sheathing, glabrous or scabrid. Umbels compound, sessile or peduncle to 100 mm long; involucral bracts 0 to 6, free, lanceolate to ovate or foliose, coriaceous or slightly succulent, acute to acuminate, margins often membranous, glabrous or scabrid; rays 3 to 26, 5–50 mm long at anthesis, glabrous or scabrid; involucel bracts 0 to 6, free, linear to lanceolate, coriaceous or slightly succulent, acute to acuminate, margins often membranous, glabrous or scabrid; raylets 4 to 14, 2–10 mm long at anthesis, glabrous or scabrid. Flowers hermaphroditic, pentamerosous; sepals indistinct, triangular; petals white, broadly oblong to ovate or obovate, 0.4–1.2 × 0.4–1.2 mm, acuminate but apices inflexed thus apparently truncate to deeply emarginated, septum present on inner face, smooth or papillose; stamens with anthers inflexed; ovary glabrous or pustulate or scabrid to densely pilose; stylopodium shortly conical; styles at first erect, short, 0.2–1.4 mm long, often lengthening as fruit matures, becoming reflexed and extending up to or beyond base of stylodium. Fruit a schizocarp, isodiametric, elliptic or ovate to very broadly ovate or rotund, sometimes transversely oblong (broader than long) in lateral view, 0.6–6.0 × 1.0–5.0 mm, base obtuse to cordate, apex obtuse; mericarps homomorphic or rarely heteromorphic, glabrous or pustulate or scabrid to densely pilose; if
homomericarpic then with median and lateral ribs as well developed as marginal ribs, if heteromericarpic then with either median or lateral ribs as well developed as marginal ribs, slightly to very prominent or winged, cartilaginous or coryx, dorsal surface sometimes with fibrous ridges, glabrous to densely pilose; marginal ribs parallel or strongly concave in lateral view; commissural vittae 2; vallecular vittae 4; commissure narrow, not extending beyond the base of the marginal ribs; carpophore bipartite.

4.1.1. Diagnostic characters
Dasispermum can be distinguished from all other genera within the Lefebvrea clade by a combination of characters, namely the mostly sympodial growth habit (resulting in leaf-opposed umbels), mostly papillose petals, isodiametric fruit with the median and/or lateral ribs as prominent as the marginal ribs, the narrow commissure extending to, at the most, the base of each rib, and the presence of a row of square or radially elongated cells external to the vittae of the fruit. When in flower the annual species may be confused with species of Capnophyllum but can be distinguished by the combination of the usually erect to ascending branches, glabrous and coriaceous leaves, scabrid rays and raylets, and the deeply emarginate petals.

4.1.2. Distribution and habitat
The seven species are endemic to South Africa (Figs. 5 to 9), occurring widely in the Eastern, Western and Northern Cape Provinces with D. humile and D. suffruticosum extending into KwaZulu-Natal. The species have been collected on littoral dunes or in fynbos, renosterveld, succulent karoo and grasslands.

4.1.3. Phenology
The annual species begin to flower in spring, with mature fruit forming from late spring to early summer. Dasispermum tenue, however, appears to flower much earlier, with mature fruit recorded in early spring (September). The perennial species, D. suffruticosum and D. perennans, flower and fruit throughout much of the year depending on climatic conditions. Although D. hispidum often co-occurs with species of Capnophyllum, they appear to form a succession, with the plants of Capnophyllum already starting to wither when those of D. hispidum begin to flower and fruit.

4.2. Key to the species of Dasispermum
1a. Short-lived suffrutes, resprouting from a permanent somewhat woody base:
   2a. Fruit with very prominent, thick, corky ribs or wings, often heteromericarpic; leaves succulent to semi-succulent, firm in texture; ultimate leaflet segments turgid or rarely laminate, often curled inwards; a dune endemic, widely distributed along the coast from Vredendal to Port Shepstone.............. D. suffruticosum
   2b. Fruit with only slightly prominent ribs, never fleshy or winged, invariably homomericarpic; leaves coriaceous; ultimate leaflet segments subterete, remaining erect; known only from around the Karbonkelberg on the Cape Peninsula............. D. perennans

1b. Annual herbs:
   3a. Fruit >3.9 mm long; stem with purple blotches; plants erect, 0.5–0.8 m tall; known only from Stanford in the Western Cape Province........ D. grandicarpum
   3b. Fruit <2.5 mm long; stem immaculate; plants erect or sprawling to procumbent, usually <0.4 m tall:

Fig. 5. Geographical distribution of Dasispermum grandicarpum (star), D. perennans (circle), D. tenue (triangle).
4a. Ultimate leaflet segments 2–3 mm broad; restricted to the Eastern Cape and KwaZulu-Natal Provinces ................. **D. humile**

4b. Ultimate leaflet segments ≤1 mm broad; occurring in the Northern, Western and Eastern Cape Provinces:

5a. All umbels sessile to subsessile, peduncle <4 mm long; involucral and involucel bracts absent (very rarely with 4 involucel bracts); styles short (0.2–0.3 mm long), not extending beyond base of stylopodium; plants restricted to renosterveld vegetation between Bonnievale and Riversdale .............

......................................................... **D. tenue**

5b. Umbels usually on a peduncle more than 10 mm long, occasionally some sessile to subsessile; involucral and involucel bracts present, often foliaceous; styles relatively long (0.3–1.3 mm long), usually extending well beyond base of stylopodium; plants not in renosterveld vegetation:

6a. Ovaries and fruit with marginal ribs markedly concave and widely separated (in lateral view); fruit broader than long; scabrid or pustulate; plants usually sprawling and prostrate .......... ................................................................. **D. capense**

6b. Ovaries and fruit with marginal ribs parallel or very slightly concave; fruit not broader than long; scabrid to densely hispid; plants usually erect ........... **D. hispidum**

### 4.3. *Dasispermum grandicarpum*


Erect, monopodial, annual herb, 0.5–0.8 m tall. **Stems** herbaceous, purple-blotched, not branched at base, simple or slightly dichotomously branched higher up; branches ascending to erect, not sprouting from nodes. **Leaves** 40–120 × 25–50 mm, 2-pinnate, coriaceous; ultimate leaflet segments linear-oblong, 3–10 × <0.5 mm, laminate to suberete, concolorous, green, margins entire, venation visible or obscure. **Petioles** 15–40 mm long, glabrous, purple-blotched. **Umbels** with peduncle short to long, 15–60 mm long; involucral bracts 4 to 6, lanceolate, coriaceous, acuminate, margins membranous, glabrous; rays (6) 10 to 18, 15–35 mm long, scabrid; involucel bracts 4 to 6, linear to lanceolate, coriaceous, acuminate, margins membranous, glabrous; raylets 6 to 14, 4–8 mm long, scabrid. **Flowers** with petals 0.8–1.0 mm × 0.6–1.0 mm, deeply emarginate, papilllose; ovary scabrid; styles usually lengthening as fruit matures, 0.7–1.4 mm long, becoming reflexed and extending well beyond base of stylopodium. **Fruit** 4.0–6.0 × 3 mm, elliptic in lateral view, base obtuse; mericarps homomorphic; median and lateral ribs as well developed as marginal ribs, prominent, cartilaginous, dorsal surface with fibrous ridges, glabrous; marginal ribs parallel to very slightly concave in lateral view.

#### 4.3.1. Diagnostic characters

*Dasispermum grandicarpum* is distinguished from all other species by the larger and more erect habit, the purple-blotched stems, and the much larger fruit, >3.9 mm long (<2.5 mm long in the other species). It shares the fibrous ridges of the fruit ribs with *D. humile* and *D. tenue* but also differs in the finely divided, suberete ultimate leaflet segments, the presence of both involucral and involucel bracts, and the row of square cells external to the vittae.

#### 4.3.2. Distribution and habitat

The species is known only from Grootbos Nature Reserve near Stanford in the Western Cape Province (Fig. 5), where it was collected in fynbos vegetation that had burnt the previous year. No plants could be located in subsequent searches by Mr H. Lutzyer, suggesting that the species may be a short-lived fireweed.

#### 4.3.3. Additional specimens examined


### 4.4. *Dasispermum tenue*


Sprawling or suberect, sympodial, annual herbs, 0.04–0.3 m tall. **Stems** herbaceous, immaculate, usually well-branched at base; branches decumbent or ascending, not sprouting from the nodes. **Leaves** 30–95 × 10–35 mm, 2-pinnate, herbaceous to very slightly coriaceous; ultimate leaflet segments linear-oblong, 2–7 × ≤1 mm, laminate, green, margins entire, venation visible. **Petioles** 15–50 mm long, slightly scabrid, green. **Umbels** sessile to subsessile on peduncles <4 mm long; involucral bracts 0; rays 3 to 6, 5–20 mm long, scabrid; involucel bracts 0 (to 4), linear to narrowly ovate, coriaceous, acute, margins not membranous, glabrous; raylets 4 to 9, 2–5 mm long, scabrid. **Flowers** with petals 0.4–0.6 × 0.4–0.6 mm, truncate to shallowly emarginate, papilllose; ovary scabrid; styles not markedly elongating in mature fruit, 0.2–0.3 mm long, remaining erect or becoming reflexed and extending almost up to base of stylopodium. **Fruit** 1.7–2.2 × 1.7–2.0 mm, broadly elliptic to rotund and convex in lateral view, base obtuse; mericarps homomorphic; median and lateral ribs as well developed as marginal ribs, prominent,
Dasispermum humile

1. diagnostic characters

D. humile resembles D. humile and D. grandicarpum in the presence of fibrous ridges on the dorsal surface of the fruit but differs from the former in the narrower ultimate leaflet segments and from the latter in the much smaller fruit and in the absence of involucral bracts. It is further distinguished by the sessile to subsessile umbels and the short styles which do not extend beyond the base of the stylopodium.

4.4.1. diagnostic characters

**Dasispermum humile** resembles **D. humile** and **D. grandicarpum** in the presence of fibrous ridges on the dorsal surface of the fruit but differs from the former in the narrower ultimate leaflet segments and from the latter in the much smaller fruit and in the absence of involucral bracts. It is further distinguished by the sessile to subsessile umbels and the short styles which do not extend beyond the base of the stylopodium.

4.4.2. distribution and habitat

This easily overlooked renosterveld endemic species is restricted to shale soils in the Western Cape Province, from Worcester in the west to Riversdale in the east (Fig. 5).

4.4.3. additional specimens examined

South Africa, WESTERN CAPE. 3319 (Worcester): Hills between the Breede River and the Brandvlei Dam, S of Worcester next to the road to Rawsonville (–CB), Le Roux 306 (NBG); Karoo Garden Veld (–CB), Perry 497 (NBG). 3320 (Montagu): hills between Buffeljagsrivier and Rietkuil (–BA), Zeyer 2672 (BM photo., S); hills near Bonnievale (–CC), Esterhuyzen 23797 (BOL); Touwsberg, farm Wolwefontein, kloof above house (–DB), Van Wyk, Winter & Tilney 3433 (JRAU, PRE). 3419 (Caledon): Lindeshof, Zeyer s.n. (S). 3420 (Bredasdorp): Windhoek, slope at Apolsfontein (–AD), Burgers 2559 (CPA). 3421 (Riversdale): Riversdale (–AB), Bolus 11291 (BOL, K); Schlechter 1703 (BOL).

4.5. Dasispermum humile


**Ptychotis mesineri** Sond. in Harv. and Sond., Fl. Cap. 2: 536 (1862), nom illegit. *Carum mesineri* (Sond.) Hiroe, Umbell. World 871 (1979), nom illegit.

Somewhat erect or rarely sprawling, symподial, annual herbs, 0.15–0.5 m tall. *Stems* herbaceous, immaculate, slightly to well-branched at base; branches ascending to erect, not sprouting from nodes. *Leaves* 40–120×30–50 mm, 2-pinnate, herbaceous; ultimate leaflet segments narrowly oblong to oblong, 7–12×2–3 mm, lanceolate, concolorous or discolorous and green above and green or glaucous beneath, margins entire, venation visible. *Petiolaris* 15–60 mm long, slightly scabrid, green. *Umbels* sometimes sessile or usually pedunculate, peduncle 0–65 mm long; involucral bracts 0 (1), lanceolate, coriaceous, acuminate, margins membranous, glabrous; rays 3 to 8, 5–20 mm long, scabrid; involucral bracts (1) 2 to 4, linear to lanceolate, coriaceous, acute, margins sometimes membranous, glabrous; raylets 4 to 12, 2–5 mm long, scabrid. *Flowers* with petals 0.5–0.7×0.4–0.6 mm, deeply emarginate, papillose; ovary scabrid; styles usually lengthening as fruit matures, 0.4–0.8 mm long, becoming reflexed and extending up to or more commonly beyond base of stylopodium. *Fruit* 1.6–2.0×1.6–2.0 mm, broadly elliptic to rotund in lateral view, base obtuse; mericarps homomorphic; median and lateral ribs as well developed as marginal ribs, prominent, cartilaginous, dorsal surface with fibrous ridges, glabrous; marginal ribs parallel to very slightly concave in lateral view.

4.5.1. diagnostic characters

**D. humile** shares the non-succulent leaves and only slightly prominent fruit ribs with **D. capense**, **D. grandicarpum**, **D. hispidum**, **D. perennans** and **D. tenue** but is distinguished from these species by the broader ultimate leaflet segments 2–3 mm broad (<1 mm in the other species). Among the other species mentioned, only the widespread **D. hispidum** is known to extend into the Eastern Cape. *Dasispermum humile* can be further differentiated from this species by the glabrous fruit, the fibrous ridges on the dorsal surface of the fruit ribs, and usually by the lack of involucral bracts.

4.5.2. distribution and habitat

The species occurs from the Zuurberg in the Eastern Cape Province to Durban in KwaZulu-Natal (Fig. 6).

4.5.3. additional specimens examined


EASTERN CAPE. 3225 (Somerset East): Boschberg (–DA), MacOwan 390 (BOL, K). – 3227 (Stutterheim): King William’s Town (–CD), Sim s.n. (PRE, 2 sheets); banks of the Kabusi River near Komga (–DB), Flanagan 1183 (BOL, 3 sheets, K, PRE, S). – 3228 (Butterworth): Koinquba Forest (–CB), Pegler 1212 (BOL). – 3325 (Port Elizabeth): Zuurberg National Park (–AD), B.-E. & M. Van Wyk 1759 (JRAU, 2 sheets); Enon (–BC), Thode A2670 (K, PRE); Ooboskloof (–BC), B.-E. & M. van Wyk 1883 (JRAU, 2 sheets), B.-E. & M. van Wyk 1895 (JRAU, 2 sheets). – 3326 (Grahamstown): Bucklands (–BA), Acocks 23793 (PRE); Hopewell (–DA), Acocks 23899 (K, PRE). – 3327 (Peddie): road through Fort Grey forest (–BB), Hilliard & Burtt 14861 (K, PRE, S). Precise locality unknown: Drége 9545 (S); Thode A2670 (K).

4.6. Dasispermum capense


**Ptychotis didyma** Sond. in Harv. and Sond., Fl. Cap. 2: 258 (1862). *Trachyspermum didymum* (Sond.) Drude in Engl. and
Prantl, Pflanzenfam. 3(8): 189 (1898). Tragiopsis didyma (Sond.) H.Wolff in Pflanzerr. Heft 90: 96 (1927). Sonderina didyma (Sond.) Adamson in Adamson and Salter, J. S. Afr. Bot. 5: 55 (1939). Stoibrax didyma (Sond.) B.L.Burtt in Tan, K., (ed.) Davis & Hedge Festschrift 145 (1989). Type: South Africa, Western Cape, woods near Tulbaghskloof, Zeyher 730 (S!, lecto., here designated; K!, two sheets, isolecto.). [Note: The specimen in S is chosen here as it is from Sonder’s herbarium and the type locality is clearly recorded on the label.]

Sprawling or very rarely somewhat erect, sympodial, annual herbs, 0.03–0.25 m tall. Stems herbaceous, immaculate, usually very well-branched at base; branches prostrate to decumbent or rarely somewhat ascending to erect, not sprouting from the nodes. Leaves 15–60×6–20 mm, glabrous or scabrid, 2-pinnate, herbaceous to somewhat coriaceous; ultimate leaflet segments linear-oblong, 1–10×<1 mm, laminare to subterete, concolorous, green or glaucous, margins entire, venation visible. Petioles 7–30 mm long, glabrous or scabrid. Umbels shortly pedunculate, very rarely sessile to subsessile, peduncles (0–)6–30 mm long; involucral bracts 1 to 6, lanceolate to ovate or often foliose, coriaceous, acuminate, margins membranous, glabrous or scabrid; rays 4 to 12, 5–15 mm long, glabrous or scabrid; involucel bracts 2 to 6, linear to lanceolate, coriaceous, acuminate, margins often membranous, glabrous or scabrid; raylets 4 to 12, 2–5 mm long, glabrous or scabrid. Flowers with petals 0.7–1×0.7–1 mm, deeply emarginate, papillose; ovary scabrid to pustulate; styles lengthening as fruit matures, 0.7–1.3 mm long, becoming reflexed and extending well beyond base of stylopodium and often beyond base of fruit. Fruit 0.6–1.8×1.0–1.8 mm, transversely oblong (broadr than long), base cordate; mericarps homomorphir, scabrid to pustulate; median and lateral ribs as well developed as marginal ribs, slightly prominent, cartilaginous, dorsal surface without fibrous ridges, scabrid to pustulate; marginal ribs strongly concave in lateral view.

4.6.1. Diagnostic characters
Dasispermum capense is easily distinguished by the transversely oblong fruit (broadr than long), with the marginal ribs strongly concave and separated from one another in lateral view. It is most often confused with D. hispidum from which it also differs in the usually procumbent branches and scabrid to pustulate (never pilose) fruit.

4.6.2. Distribution and habitat
The species occurs in sandy soils (at low and medium altitudes) from Port Nolloth in the Northern Cape southwards to the Cape Peninsula and eastwards to Witsands in Western Cape (Fig. 7).

4.6.3. Additional specimens examined
South Africa, NORTHERN CAPE. 2916 (Port Nolloth): near Port Nolloth (BB), Bolus 9510 (BOL, K). 2917 (Springbok): Spektakel (–DA), Bolus 9645 (BOL, K); Concordia (–DB), Schlechter 11404 (BOL, K). 2918 (Gamoep): Koisabes Farm (–AB), Le Roux 2529 (BOL, NBG); Goegap Nature Reserve (–CA), Broodryk 151 (PRE). 3119 (Calvinia): Nieuwoudtville (–AC), Galpin 1158 (PRE); Tuinlaagte, Oorlogskloof (–AC), Magee et al. 128 (JRAU); Lokenburg (–CA), Acocks 17221.
4.7. Dasispermum perennans

_D. perennans_ Magee and B.-E.van Wyk, sp. nov., a _Dasispermum hispidum_ habitu perenni repullanti et caule ligneo permanenti differt et a _D. suffruticoso_ foliis teretiusculis coriaceis ceraceis viribus (in _D. suffruticoso_ foliis succulentis, plerumque glaucis), petalis papillosis et fructu costis modo leviter prominentibus (in _D. suffruticoso_ manifeste costato vel alato). Type: South Africa, Western Cape, 3418 (Simonstown): sandy flats between Noordhoek and Kommetjie, _Esterhuysen_ 34312 (BOL, holo.; BOL, 2 sheets, K, S, iso.).

Sporawling (erect when young), sympodial, short-lived suffrutes 0.15–0.5 m tall, resprouting. _Stems_ permanent, woody, immaculate, at first simple becoming slightly to well-branched; branches ascending to somewhat decumbent, sprouting at nodes. _Leaves_ 20–90×10–40 mm, glabrous, 2-pinnate, coriaceous; ultimate leaflet segments linear-oblong, 1–3×b mm, subterete, concolorous, bright green, margins entire, venation visible or obscure. _Petioles_ 5–40 mm long, glabrous. _Umbels_ with peduncle short to long, 20–100 mm long; involucral bracts 1–6, lanceolate to ovate or often foliose, coriaceous, acuminate, margins usually membranous, glabrous; rays (4)10 to 20, 15–30 mm long, scabrid; involucel bracts 2 to 6, linear to lanceolate, coriaceous, acuminate, margins often membranous, glabrous; raylets 8 to 10, 3–5 mm long, glabrous or scabrid. _Flowers_ with petals 0.8–1.2×0.8–1.2 mm, deeply emarginate, papillose; ovary glabrous; styles lengthening as fruit matures, ±1.0 mm long, becoming reflexed and extending beyond base of stylodium. _Fruit_ 2.0–2.5×1.5–2.5 mm, broadly ovate in lateral view, base obtuse to very slightly cordate; mericarps homomorphic, glabrous; median and lateral ribs as well
developed as marginal ribs, slightly prominent, cartilaginous, dorsal surface without fibrous ridges, glabrous; marginal ribs parallel to very slightly concave in lateral view.

4.7.1. Diagnostic characters

*Dasispermum perennans* is vegetatively most similar to *D. hispidum* and *D. suffruticosum* but differs from *D. hispidum* in the perennial habit and permanent woody stem, and from *D. suffruticosum* in the subterete coriaceous, waxy green leaves (vs succulent, glaucous leaves in *D. suffruticosum*), papillose petals (vs glabrous) and fruit with only slightly prominent ribs (vs prominently ribbed or winged in *D. suffruticosum*).

4.7.2. Distribution and habitat

The species is known only from the Cape Peninsula between Noordhoek and Karbonkelberg (Fig. 5) where it occurs on very deep sandy soils often amongst *Thannochortus erectus* (Restionaceae).

4.7.3. Additional specimens examined

South Africa, WESTERN CAPE. 3418 (Simonstown): Hout Bay (–AB), Bond 434 (NBG); Karbonkelberg, on SE slopes (–AB), Esterhuysen 28979 (BOL, K); Sandy Bay, Table Mountain National Park (–AB), Magee & Boatwright 105 (JRAU, NBG); Winter 3850 (JRAU, PRE!).

4.8. *Dasispermum hispidum*


Type: South Africa, [Western Cape], without precise locality or date, Thunberg s.n. (Thunb., Prodr. 51: 189 (1898). Type: South Africa, [Western Cape], 3318 (Capetown) Riebeekkasteel (–AB), Pillans 18056 (BOL, K); Sandy Bay, Table Mountain National Park (–AB), Magee & Boatwright 105 (JRAU, NBG); Winter 3850 (JRAU, PRE!).

4.8.1. Diagnostic characters

*Dasispermum hispidum* is most likely to be confused with *D. capense* or *D. perennans* with which it shares the prominent involucel bracts (one of which is often foliose) and the usually scabrid fruit with ribs that are not fibrously ridged on the dorsal surface. It differs from *D. perennans* in the annual habit and from *D. capense* in the usually erect growth form, fruit that are narrower or at most equal to their length (in lateral view) and with the marginal ribs of the ovary and young fruit remaining parallel or only slightly concave. Very small plants of *D. hispidum*, as often found in the Northern Cape Province, have consistently been misidentified as *D. tenue*, which is a Renosterveld species easily distinguished from *D. hispidum* by the consistently sessile to subsessile umbels and the absence of both involucro and involucel bracts.

4.8.2. Distribution and habitat

This widespread species is largely restricted to coastal sands, from around Lekkersing in the Northern Cape Province to St George’s Strand in the Eastern Cape Province (Fig. 8).

4.8.3. Additional specimens examined

South Africa. NORTHERN CAPE. 2816 (Oranjemund): 37 km N of Lekkersing (–DB), Germishuizen 5596 (PRE); Richtersveld, Annislavkte (–DB), Jürgens 23129 (PRE); Taibos Vlei, Little Namaqualand (–DB), Marloth 12421 (PRE); Witbank, Little Namaqualand (–DC), Pillans 5234 (BOL).

3017 (Hondeklipbaai): between Hondeklipbaai and Swart Lintjes River (–AD), Pillans 18056 (BOL); Farm Hardekoppie, 16 km N of Kotzesrus and 2 km W of Hardelevi (–DC), Perold 1699 (PRE). 3117 (Lepelfontein): Brand-se-baai (–BD), Van Rooyen 2210 (PRE).

WESTERN CAPE. 3118 (Vanrhynsdorp): Donkin’s Bay (–CD), Acocks 24166 (PRE); Vanrhynsdorp (–DA), Compton 17173 (NBG); 7 miles N of Vanrhynsdorp (–DA), Acocks
19502 (PRE, K); 7 miles N.N.E. of Vanrhynsdorp (–DA), Acocks 14746 (K); Wiedou Valley on road to Gifberg (–DB), Hugo 702 (PRE); Wiedou, on the foot of the Gifberg (–DB), Zietsman & Zietsman 1162 (PRE); top of Gifberg (–DC), Bayliss 6148 (MO); Vleiark, east of Klawer (–DC), Walters 51 (PRE, MO).

3217 (Vredenburg): Cape Columbine (–DD), Lavranos 11710 (MO); Witklip Farm 1 mile S of Vredenburg (–DD), Thompson 2658 (PRE, 2 sheets).

3218 (Clanwilliam): Clanwilliam (–BB), Galpin 10770 (PRE), Leipoldt 15 (BOL); Oliphants River Valley near Platte Kloof (–BB), Pillans 8741 (BOL, K, PRE); between Sauer and Velddrif (–CD), Goldblatt & Manning 10404A (PRE).

3318 (Cape Town): Oosterwal, Langebaan (–AA), Axelson 562 (NBG); Darling Flora Reserve (–AD), Rycroft 2009 (NBG); Mud River, N of river near bridge (–AD), O’Callaghan 1322 (PRE); Mud River Kloof (–AD), Acocks 23381 (K, PRE), Taylor 5489 (NBG, K, PRE); Bokbaai near Darling (–CB), Hilliard & Burtt 13020 (MO, K, PRE, S); Bok Point Gate (–CB), Compton 9418 (NBG); 9 km from Melkbosstrand to Velddrif (–CB), Stirton 11190 (PRE); Burgers Post Farm, near Pella (–DA), Boucher & Shepherd 4869 (K, PRE).

3319 (Worcester): Saron (–AA), Schlechter 10638 (K, LE, MO, PRE), Schlechter 10652 (PRE); De Hoek Estates (–AA), Levyns 993 (BOL).

3322 (Outshoorn): Wilderness (–DC), Mogg 11786 (PRE).

3418 (Simonstown): Chapmans Bay (–AB), Wolley Dod 3606 (BOL); Fish Hoek (–AB), Young 268 (BOL); Prince’s Vlei (–AB), Marloth 9414 (NBG, PRE); Faure Flats (–BB), Adamson 10367 (NBG); Red Hill (–AB), Salter s.n. (BOL); Witsands Bay (–AB), Werdermann & Oberdieck 811 (BOL, K).

3419 (Caledon):1 km from Gansbaai on road to Stanford (–CB), Germishuizen 4140 (PRE).

3420 (Bredasdorp): De Hoop, De Mond (–AD), Magee & Boatwright 12 (JRAU), Magee et al. 120 (JRAU), Thompson 3265 (NBG, PRE).

3421 (Riversdale): Still Bay (–AD), Muir 4554 (BOL, K, PRE); Potberg Nature Reserve, De Hoop (–BC), Burgers 1569 (PRE).

3422 (Mossel Bay): NE of Mossel Bay (–AB), Acocks 15394 (BOL); Belvidere, Knysna (–BB), Duthie 1181 (BOL, NBG); Ruigte Vlei, at Swart River (–BB), Fourcade 1552 (BOL, 2 sheets); camping area close to Swartvlei, Sedgefield (–BB), Hugo 1988 (NBG).

3423 (Knysna): Plettenberg Bay (–AB), Schlechter 5937 (BM, K, S).

EASTERN CAPE. 3324 (Steytlerville): E of Kabeljousriver (–DD), Fourcade 4017 (BOL, K).

3325 (Port Elizabeth): Perseverance (–DC), Rodin 1252 (BOL, K, PRE, S); St George’s Strand (–DC), Long 839 (K, PRE).

4.9. Dasispermum suffruticosum


Siium patulum Thunb., Prodr. 51 (1794). Type: South Africa, Western Cape, in littore Houteniquas [Outeniquas], Thunberg s.n. UPS-THUNB 7055 (UPS-THUNB!, hol.).


Sprawling to prostrate (erect when young), symподial, short- lived suffrutices, 0.10–0.4 m tall, resprouting. Stems woody, imaculate, at first simple becoming slightly to well-branched; branches decumbent to prostrate, sprouting at nodes. Leaves 15–100×10–40 mm, glabrous, pinnate to 2-pinnate, firm and semi-succulent; ultimate leaflet segments oblong, 1–4×1–3 mm, turgid or rarely laminate, usually strongly curled inwards, concolorous, glaucous or sometimes green, margins entire or toothed, venation usually obscure. Petioles 5–40 mm long, glabrous. Umbels with peduncle short to long, 10–80 mm long; involucral bracts 4 to 6, lanceolate to ovate, slightly succulent, acute to acuminate, margins usually membranous, glabrous; rays 6 to 26, 8–32 mm long, glabrous or scabrid; involucel bracts 4 to 6, lanceolate, slightly succulent, acute to acuminate, margins often membranous, glabrous; raylets 6 to 14, 2–5 mm long, glabrous. Flowers with petals 0.8–1.0×0.8–1 mm, apex slightly to deeply emarginate, smooth; ovary glabrous; styles lengthening as fruit matures, 0.8–1.0 mm long, becoming reflexed and extending up to or beyond base of stylodium. Fruit 2.5–6.0×3.0–5.0 mm, ovate to very broadly ovate in lateral view, base obtuse; mericarp homomorphic or heteromorphic, glabrous; if homomericarpic then with median and lateral ribs as well developed as marginal ribs, if heteromericarpic then with either median or lateral ribs as well developed as marginal ribs, very prominent to winged, corky, dorsal surface without fibrous ridges, glabrous; marginal ribs parallel in lateral view.

4.9.1. Diagnostic characters

This highly specialised littoral species can readily be distinguished from the other species of Dasiperum by the suffrutescent habit (often with slender stems adapted to emerge and form new plants when covered by moving sand), the succulent leaves with the ultimate leaflet segments often curled inwards, and the prominently ribbed or often winged fruit, with the ribs or wings corky.

4.9.2. Distribution and habitat

Dasiperum suffruticosum is a halophytic species with a very wide distribution along the South African coastline, occurring on littoral dunes from Vredendal in the Western Cape to Port Shepstone in KwaZulu-Natal (Fig. 9).

4.9.3. Additional specimens examined

South Africa. KWAZULU-NATAL. 3030 (Port Shepstone): Isipingo beach (–BB), Forbes & Obermeyer 45 (PRE); Port Shepstone (–CB), Bayliss 2199 (NBG), Moggs 745 (PRE); between Ramsgate and Margate (–CD), Whellan 1065 (PRE).

WESTERN CAPE. 3118 (Vanrhynsdorp): district Papendorp, Farm Geelwalkaros 262 (–CA), Sachsé 472 (PRE); Vredendal, dunes opposite Rob Island, N of Oliphants River Mouth (–CA), Le Roux & Ramsey 77 (PRE). 3217 (Vredenburg): Shell Bay near Veldrif (–DB), Marsh 1283 (NBG). 3218 (Clanwilliam): Pakkkulsfontein, 5 ½ miles NW of L’ Agulhas (–CB), Yssel 1833 (NBG); Rocher Pan Nature Reserve (–CB), Brandt 8 (NBG); beach N of Berg River Mouth (–CC), O’Callaghan 184 (NBG). 3317 (Saldanha): Hoedjies Point (–BB), Van Rensburg 126 (PRE). 3318 (Cape Town): Saldanha Bay between Churchhaven and South Point (–AA), Brenan 14020A (NBG), Hall 855 (NBG); Sandveld Forestery Area (–AC), Low 815 (NBG); Ysterfontein (–AC), Glen 1090 (PRE), Reynke 32 (PRE); Koeberg beach (–CB), Barnes 2441 (PRE); Bloubergstrand (–CD), Compton 8920 (NBG), Manning & Reeves 2819 (NBG), Pole Evans 4389 (PRE), Raitt s.n. (NBG); Milnerton (–CD), Andreave 381 (NBG). 3323 (Willowmore): Nature’s Valley (–DC), Stirtan 9628 (PRE). 3418 (Simonstown): Cape Peninsula, on sand dunes, Millers Point (–AB), Bond 287 (NBG); Hout Bay (–AB), Thode 6243 (NBG); Scarborough (–AB), Goldblatt 6753 (PRE); Schuster’s River Mouth (–AB), Whellan 1741 (PRE); Simon’s Bay (–AB), Prior s.n. (PRE); Cape of Good Hope Nature Reserve, Platboom Bay (–AB), Taylor 6533 (NBG, PRE); Cape Point (–AB), Marloth 3246 (PRE), Phillips s.n. (PRE), Wall 166 (S); Slippadvlei flats (–AD), Van der Merwe 6069 (NBG); near Slangkop (–AD), Marloth 11868 (NBG); Macassar beach (–BA), Downing 402 (NBG); Macassar dunes (–BA), De Bryun s.n. (NBG); Seekoei River Mouth (–BA), Parsons 26 (NBG, PRE); Strandfontein (–BA), Henderson 1164 (NBG), Rycroft 2363 (NBG), Taylor 3180 (PRE); Strand (–BA), Parker 4395 (NBG, PRE), Strand 4350 (NBG); Hol Bay Peninsula, E of Cape Hangklip (–BD), Rourke 696 (NBG). 3419 (Caledon): Kleinmond (–AC), Van Wyk 6069 (NBG); Hermanus, Grooto Beach (–AD), Taylor 9876 (NBG, PRE); Hermanus, Mossel River (–AD), Guthrie s.n. (PRE); Dawidksraal (–BD), Walsh s.n. (PRE); Pearly beach (–CB), Maguire 24 (NBG), Meyer 2388 (PRE), Taylor 4045 (NBG, PRE). 3420 (Bredasdorp): De Hoop, De Mond (–AD), Jordaan s.n. (NBG); Stibbaai (–BD), Beyleveld s.n. (NBG), Bohnen 412.7 (NBG), Rycroft 3079 (NBG, S); Witsand river mouth (–BD),
Hugo 1908 (NBG, PRE); Arniston (–CA), Galpin 11348 (PRE); Waenhuiskrans (–CA), Greuter 21965 (PRE), Westhuizen 125 (PRE); Skipskop (–CB), Scott 478 (NBG); Agulhas (–CC), Fellingham 381 (NBG, PRE), Taylor 1588 (PRE). 3421 (Riversdale): Still Bay (–AD), Bakker 5880 (PRE), Bohnen 412.7 (PRE), Muir 111 & 4533 (PRE). 3422 (Mossel Bay): Blinde River Estuary (–AA), O’Callaghan, Fellingham & Van Wyk 263 (NBG, PRE); Hartenbos river mouth (–AA), Parsons 321 (NBG, PRE); Kleinbrakrivier (–AA), Du Plessis 14 (PRE), Meyer 2288 (PRE); Mossel Bay (–AA), Rogers 4243 (NBG, PRE), Glentana beach (AB), Goldblatt & Manning 9522A (NBG), Wilderness (–BA), Compton 10727 (NBG), Marloth s.n. (PRE), Mogg 11884 (PRE); Goukamma Nature Reserve (–BB), Anon. 187 (PRE); Kingfisher Creek, Sedgefield (–BB), Wiisura 2681 (NBG); Mazeppa Bay (–BC), Hilnes 508 (PRE); Kei Mouth (–CB), Flanagan 257 (PRE, S); Strey 11239 (PRE); Kentani (–CB) Pegler 892 (PRE). 3327 (Peddie): Fish River Mouth (–AC), Phillipson 178 (PRE); East London (–BB), Commens 1034 (PRE), Galpin 3301 (PRE). 3424 (Humansdorp): Jeffreys Bay (–BB), Stirton 9601 (PRE), Taylor 5146 (NBG), St Francis Bay (–BB), Brand 197 (PRE). 3425 (Skoenmakerskop): Sea View (–AB), Long 253 (PRE).

**Acknowledgements**

The curators and staff of the cited herbaria are thanked for their kind hospitality and assistance during visits and for making specimens available on loan. Dr G. Koorsen (University of Johannesburg) is gratefully acknowledged for translating the diagnoses, Mrs A. Le Roux (Applied Behavioural Ecology & Ecosystem Research Unit, UNISA) and Ms M.M. le Roux (University of Johannesburg) for supplying some of their photographs and Mr H. Lutzeyer (Grootbos Nature Reserve) for providing material of *D. grandicarpum*. This study was funded by the University of Johannesburg and the National Research Foundation.
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Edited by JC Manning