



## Short communication

# *Cotula sericea* resolved as the correct name for the mysterious *C. fallax* (Asteraceae: Anthemidae), with new synonyms and the new combination *Cotula discolor*

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## ABSTRACT

*Cotula sericea* L.f. was based on an unlocalised collection from the southwestern Cape of a species with conspicuously petiolate, palmately bipinnatisect leaves and long, leafless scapes with discoid capitula subtended by glabrous, uninerved involucre bracts. It has, however, been historically misapplied to plants from the southern and southeastern South African coast with the leaves extending onto the base of the apically inflated peduncle and with shortly radiate capitula and ovate, ± trinerved bracts. The nomenclatural and taxonomic history of the species is clarified and a lectotype is designated. True *C. sericea* is a high altitude, local endemic restricted to a few mountains in the Cold Bokkeveld of Western Cape, and we provide a full description and illustration based on wild-collected material. We conclude that it is an older name for the mysterious *Cotula fallax* D.J.N.Hind, recently described from cultivated material of unknown but possibly South African origin, and which we accordingly place in synonymy. The name *Cenia discolor* DC. is available for the heterogamous coastal taxon and we make the new combination *Cotula discolor* (DC.) J.C. Manning & Mucina for it in *Cotula*. Finally, we conclude that the poorly known *Cotula mariae* Bremer & Humphries from Cape Recife, Port Elizabeth, is an extreme maritime form of *Cotula discolor* and reduce it to synonymy.

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## 1. Introduction

*Cotula* L. as currently circumscribed is a Southern Hemisphere genus of ± 55 species distributed through South and Central America, Africa, Australia, New Zealand and the southern oceanic islands, with its centre of diversity in southern Africa, where some 43 species are recorded (Herman et al., 2000; Oberprieler et al., 2009). Although the largest genus of Anthemidae subtribe Cotulinae Kitt. (Oberprieler et al., 2009), phylogenetic studies by Himmelreich et al. (2012) suggest that generic circumscriptions in the subtribe require revision. *Cotula* is presently defined by solitary, ± pedunculate capitula with an epaleate receptacle and 4-lobed florets, and dorsiventrally flattened cypselas with two lateral ribs or wings. The capitula may be homogamous and discoid, or heterogamous and either disciform or radiate, in which

case the marginal florets are typically pedicellate. The corolla of the central florets in particular is sometimes compressed or winged and constricted at the base.

The southern African species were last revised by Harvey (1865), although Hilliard (1977) provided a more recent valuable review of the species from the KwaZulu-Natal Drakensberg. These, however, comprise a small minority of the southern African species, the bulk of which are concentrated in the southwestern Cape. In his review, Harvey (1865) segregated the species into three unranked groups [incorrectly regarded as sections by Hind (2006)] based on the distribution of fertile and neuter florets in the capitula. [Unranked] *Eu-Cotula* (now including *Cenia* Comm.) and comprising the majority of the species, was diagnosed by its heterogamous, disciform or radiate capitula with marginal female florets in one or two rows; the monotypic [unranked] *Pleiogyne* was distinguished by heterogamous capitula but multiseriate female marginal florets and few, often sterile disc florets; and [unranked] *Discocotula* was defined by its homogamous, discoid capitula.

During the preparation of the account of *Cotula* for *Cape Plants* (Goldblatt and Manning, 2000) we encountered several collections of an apparently undescribed member of the *Discocotula* group from the

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mountains of the Western Cape, which we treated as *Cotula* sp. 1. The collections, the earliest dating back to 1908, were routinely identified in local herbaria as *Cotula sericea*, a name that has customarily been applied to a species from the coastal and near-coastal parts of the south and southeast coast of South Africa, from Mossel Bay in Western Cape to East London in Eastern Cape. Treated under the name *Cenia sericea* by Harvey (1865), it is a ±decumbent perennial with sericeous, bipinnatisect leaves running up onto the lower portion of the flowering peduncle, and with heterogamous, shortly radiate capitula. The apex of the peduncle is fistulose or inflated in fruit, a characteristic of the species previously segregated as the genus *Cenia*.

Recently, Nicolas Hind (Hind, 2006) described the new species *Cotula fallax* D.J.N.Hind from cultivated material of unknown wild origin, speculating that it was most probably South African. Plants of this taxon are widely available commercially and in Botanical Gardens across the Northern Hemisphere under the names *Cotula hispida* and *Cotula lineariloba* but are certainly neither of these species. It has been in cultivation in Europe from at least the early 1980s but was probably introduced well before then (Hind, 2006). In South Africa we know it in cultivation from a garden in the Free State town of Kestell. The name *C. fallax* is regarded as unresolved in The Plant List ([www.theplantlist.org](http://www.theplantlist.org) accessed 6 November 2012), evidently because it is still known only from cultivated material and remains unknown in the wild.

During preparation of an update of Cape Plants (Manning and Goldblatt, 2012) we had occasion to re-examine the issue of *Cotula* sp. 1. The wild-collected plants are a close match in all particulars with the protologue of *C. fallax*, notably in their petiolate leaves with diagnostic indumentum and scapose peduncles, differing only in their slightly smaller leaves and larger capitula. We have also had the opportunity of comparing the wild material with cultivated plants of *C. fallax* and have no doubt that they represent the same species. As part of this investigation we examined the identity of *Cotula sericea* and were surprised to uncover substantial confusion around the application of this name.

We conclude that the name *Cotula sericea* has been misapplied to a heterogamous taxon from the southern and southeastern coastal regions of South Africa and that it is in fact the earliest name for *C. fallax*. We provide an illustration and a full description of *Cotula sericea* with complete synonymy, ecological notes and a distribution map, establishing it as a high altitude endemic of the Western Cape mountains. Finally, we conclude that the name *Cenia discolor* is available for the coastal taxon and make the necessary transfer to *Cotula*.

## 2. Materials and methods

Types of all relevant names were checked, either online in JSTOR (<http://plants.jstor.org>) or the Linnean herbarium (<http://www.linnean-online.org>), or on microfiche. Collections at BOL, NBG, PRE and SAM, the main herbaria with good representation of collections of Cape species, were consulted (herbarium acronyms after Holmgren et al., 1990).

## 3. Results

### 3.1. *Cotula sericea*

*Cotula sericea* L.f. (1782) was described in the *Supplementarum plantarum*, based on an unlocalised collection from South Africa. There are two specimens labelled *Cotula sericea* in the Linnean herbarium. Only one of them, LINN1014-31, originally from Thunberg's herbarium, matches the protologue, notably the perennial habit, decomposed, sericeous leaves and obtuse, uninerved involucre bracts. We accordingly select it as the lectotype. The second sheet with this name, LINN1014-32, is the annual species *Cotula nudicaulis* Thunb., characterised by distinctive multi-nerved, suborbicular bracts, and clearly not consistent

with the protologue. Most of the younger Linnaeus's new species from southern Africa were based on material collected by C.P. Thunberg (1743–1828) and there are also two sheets under the name *Cotula sericea* in Thunberg's own herbarium in Uppsala (UPS-THUNB20227 and 20228) and a third in Lund (LD1240226). The first of the two sheets in Thunberg's herbarium, as well as that in Lund, represent the same species as the Linnean specimen and may be duplicate gatherings [and thus potential isotypes] but this cannot be assumed for certain. All three of these specimens of *Cotula sericea* are a good match of our *C. sp. 1*, with the same distinctive tufted, perennial habit, sericeous leaves, and leafless scape with oblong, glabrous bracts and discoid capitulum.

The second sheet in the Thunberg herbarium (UPS-THUNB20228) formed the basis for the new species *Cotula thunbergii* Harv. (1865). It is an annual taxon with sericeous bracts and we do not consider it further here.

Thunberg (1823) included *Cotula sericea* in his *Flora capensis* without further comment, leading Harvey (1865) to attribute the name to him but this is incorrect. *Cotula sericea* was subsequently transferred to the genus *Cenia* as *Cenia sericea* (L.f.) DC. by Candolle (1838), who cited not only Thunberg's collection but additional specimens collected by J.F. Drège (1794–1881) between the Zuurberg and the Sondagsrivier [Sunday's River] in Eastern Cape. Candolle's citation of the basionym *Cenia sericea* L.f. makes it clear that he was transferring the epithet to *Cenia* and not describing a new species in that genus. It is evident from Candolle's generic placement of the species in *Cenia* and also from the additional specimens cited by him that he misapplied the name to a taxon from the southern and southeastern coastal regions of Western and Eastern Cape with an apically inflated peduncle, shortly radiate capitula and ovate, trinerved bracts. This is the application that is currently in use (eg. Goldblatt and Manning, 2000).

This situation was further complicated by Harvey (1865), who correctly appreciated that two distinct species were involved under the epithet *sericea* but muddled the nomenclature. Harvey (1865) followed Candolle in applying the name *Cenia sericea* (which he misattributed to Candolle as a new species, excluding the basionym as a purported synonym) strictly to the heterogamous taxon from the southern Cape, but simultaneously maintained the name *Cotula sericea* (which he misattributed to Thunberg instead of L.f., missing the fact that it is the basionym of *Cenia sericea*). Restricting the application of the name *Cotula sericea* to the first of the two Thunberg herbarium collections from the southwestern Cape (UPS-THUNB 20227), he included in synonymy another homogamous species that had been described from the Witteberg in Eastern Cape by Candolle under the name *Tanacetum linearilobum* DC. (1838). This name was later removed from synonymy and transferred to *Cotula* by Hilliard & Burt (1973) as *C. lineariloba* (DC.) Hilliard.

Although Thunberg's *Cotula sericea* does bear a marked resemblance to Candolle's *T. linearilobum*, Hilliard & Burt (1973) were correct in their appreciation that the two were not conspecific. *C. lineariloba* is a species of the summer-rainfall Drakensberg in Eastern Cape and KwaZulu-Natal and differs from *Cotula sericea* in several respects, notably in lacking the diagnostic dimorphic indumentum of dense, short hairs mixed with longer, straggling hairs that characterises *Cotula sericea*. More obviously, the leaves run up shortly onto the peduncle, and the capitula are larger, 13–20 mm diam., with pedicellate florets.

From our examination of the type material, we conclude that the name *Cotula sericea* correctly applies to the high altitude, discoid species from the Cold Bokkeveld in Western Cape treated as *C. sp. 1* by Goldblatt and Manning (2000), and later described as *C. fallax* by Hind (2006). Thunberg had two opportunities of encountering *Cotula sericea* in the mountains of the Cold Bokkeveld (Forbes, 1986). In mid-October 1773, on his second journey into the interior, he travelled the length of the Cold Bokkeveld from Citrusdal to Ceres, and specifically mentioned Tafelberg, one of the known localities for the species, unfortunately without indicating whether or not he ascended the peak. The following year,

on 9 and 10 December 1774, he passed through Karooport, which skirts the Baviaansberg, another known locality for the species, but once again without any mention of his collecting activities.

*Cotula sericea* L.f., Supplementarum plantarum: 377 (1782); Thunb.: 696 (1823). *Cenia sericea* (L.f.) DC.: 82 (1838). *Cotula sericea* var. *concolor* Harv.: 185 (1865), nom. illegit. Type: South Africa, 'Cap. b. spei', Thunberg 97 (LINN1014-31—LINN image!, lecto., designat- ed here).

*Cotula fallax* D.J.N.Hind: 309 (2006), **syn. nov.** Type: cultivated at Royal Botanic Gardens Kew from material originally from Oxford University Botanic Garden, 5 July 2005, Kew Accession 1988-3145 (K, holo.).

Tufted, rhizomatous perennial, forming small mats, stems decumbent, woody at base, leafy at branch tips. Leaves opposite, imbricate, conspicuously petiolate, petiole (8–)10–25 mm long, base dilated and half-clasping, connate with opposite member for  $\pm 2$  mm and sheathing stem, blade ovate-orbicular in outline, 5–20  $\times$  5–15 mm,  $\pm$  palmately bipinnate, lobes terete, obtuse, silvery sericeous with a mixture of spreading or  $\pm$  appressed, dense, velutinous hairs  $\pm 0.5$  mm long and sparse, longer, straggling hairs  $\pm 2$  mm long, sheathing bases persistent and covering stems. Capitula discoid, homogamous, solitary on terminal, leafless, scapose peduncle 100–300 mm long, peduncle pubescent at base with vestiture as on leaves but rapidly glabrescent and glabrous for most of length, reddish or golden brown. Involucre depressed-globose, 7–8 mm diam.; phyllaries 3-seriate, oblong, outermost 2  $\times$  1 mm, innermost 4  $\times$  1.5 mm, obtuse, glabrous, with broad, scarious margins and tips up to 0.7 mm wide, margins minutely erose distally, stereome green suffused with purple around edges and with solitary, dark purple, median resinous vein. Florets numerous, sessile, yellow; corolla 4-lobed,  $\pm 2$  mm long, campanulate with lower cylindrical portion  $\pm 1$  mm long, lower portion of tube compressed and slightly winged, rugose and sparsely puberulous with twin-hairs, shortly ear-frilled at base. Anthers  $\pm 1$  mm long including ovate apical appendage; base apiculate; filament collar cylindrical. Ovary ellipsoid and slightly compressed, with inner face flat and outer face convex,  $\pm 1.5$  mm long; style terete with swollen base, branching below mouth of tube, scarcely exerted, branches  $\pm 0.3$  mm long, lateral margins stigmatic, apices truncate with crown of papillae. Cypselas ellipsoid-obovoid and slightly compressed, faces slightly convex and weakly longitudinally keeled, with marginal rim but not evidently winged, glabrous. Flowering time: December–January. Fig. 1.

**Distribution and ecology:** restricted to shale bands at high altitudes on the higher peaks (Waboomsberg, Bokkeveld Tafelberg, Baviaansberg) in the Cold Bokkeveld, Western Cape (Fig. 2), occurring on deep, skeletal loamy soils in Northern Inland Shale Band Vegetation (Rebello et al., 2006).

**Diagnosis and relationships:** among the homogamous, perennial species of *Cotula*, *Cotula sericea* most closely resembles *C. lineariloba* (DC.) Hilliard and the two were treated as conspecific by Harvey (1865). Although similar in their rhizomatous, tufted habit (Fig. 3A) and homogamous, discoid capitula, *C. lineariloba*, which is restricted to the Drakensberg Mountains from the Witteberg in Eastern Cape northwards into KwaZulu-Natal and Lesotho, has the foliage extending onto the peduncle as a series of progressively smaller leaves, with a more uniform vestiture of  $\pm$  similar length, appressed hairs that become longer and more silky towards the base of the petioles. The capitula are larger,  $\pm 10$ –25 mm diam., with distinctly pedicellate florets. *Cotula sericea*, from the Cold Bokkeveld in Western Cape, has a diagnostic indumentum of dense, short hairs mixed with longer, straggling hairs and a leafless, scapose peduncle with smaller capitula, 7–8 mm diam., and sessile florets.

Wild collections of the species differ from the cultivated material that formed the basis of *C. fallax* in several dimensions, notably their generally longer petioles, 8–25 mm vs 7–9 mm long, slightly longer peduncles, 100–300 mm vs 40–80 mm, and slightly smaller

capitula, 7–8 mm diam. In the critical characters of the scapose inflorescence and the dimorphic indumentum on leaves and base of the scape [a mix of spreading or  $\pm$  appressed, dense, velutinous hairs  $\pm 0.5$  mm long and more sparse, longer, straggling hairs  $\pm 2$  mm long], however, they are alike. It is most likely that the cultivated plants represent a horticultural selection for its more compact habit and larger capitula.

### 3.1.1. Additional specimens seen

WESTERN CAPE.—**3219** (Wuppertal): Koue Bokkeveld, Tafelberg, (–CD), 8 Dec. 1940, Compton 10065 (NBG); 5000' [1700 m], 8 Dec. 1940, Esterhuysen 3910 (BOL); 1650 m, (–CD), 26 Nov. 2010, Helme 6637 (NBG). **3319** (Worcester): Waboomsberg, summit ridge, 1720 m, (–AD), 3 Dec. 2006, Helme 4064 (NBG); 23 Nov. 2007, Mucina 231107/01 (NBG); slopes at Hottentot's Kloof, 29 Nov. 1908, Pearson 4901 (BOL); Baviaansberg, (–BA), 2 Jan. 1942, Bond 1448 (NBG).

### 3.1.2. Cultivated

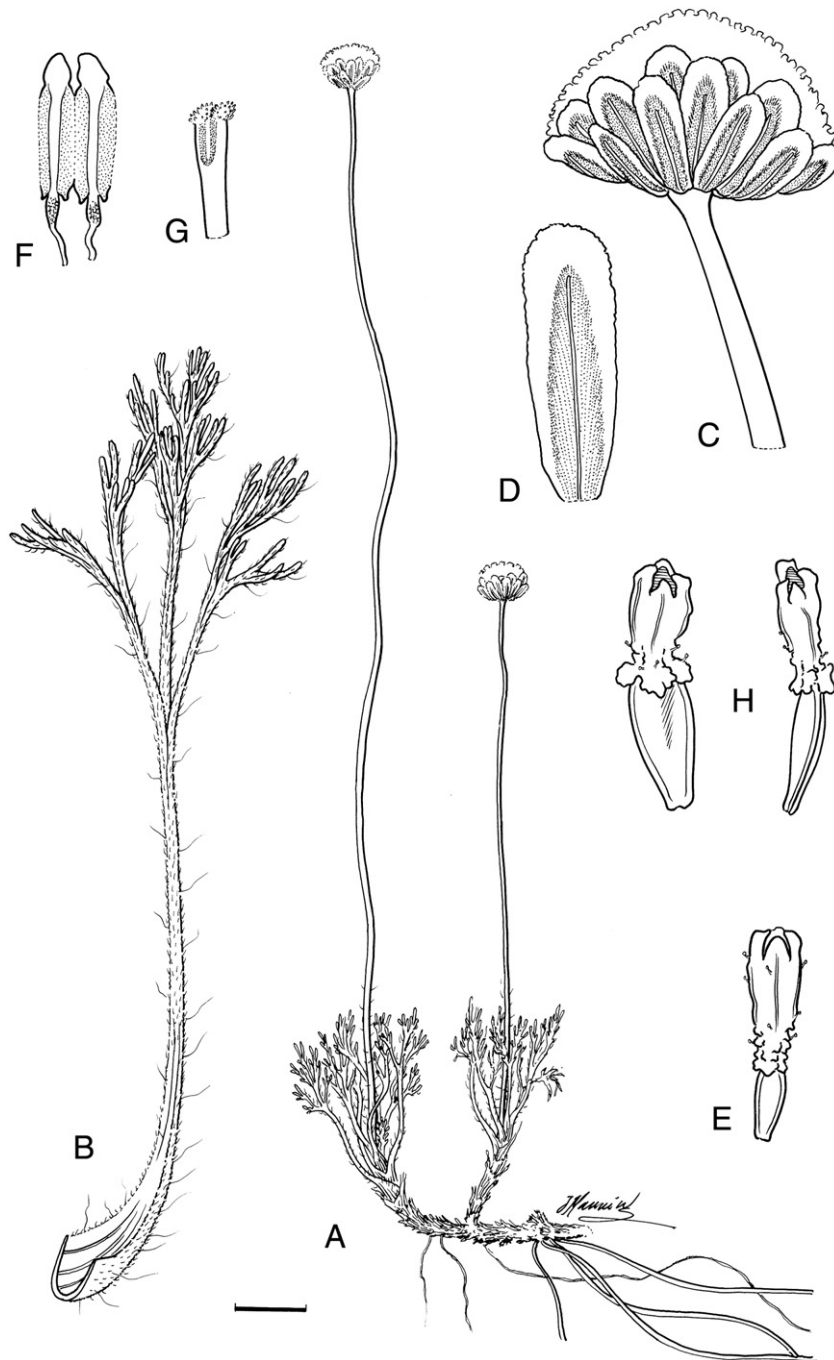
FREE STATE.—**2828** (Bethlehem): Kestell, garden of 2 Piet Retief Street, (–BC), 28 Jan. 2001, Mucina 28010/1 (NBG).

### 3.2. *Cotula discolor*

It remains to establish whether a name is available for the heterogamous southern and southeastern coastal species that has been misidentified as *Cotula sericea*.

Among the radiate species included in *Cenia* by Candolle (1838) was his new species *Cenia discolor* DC., based on an unlocalised collection from the southwestern Cape made by P.J. Verreaux (1807–1873), who certainly collected in the Knysna area, plus [but with a slight cautionary comment] a second collection by J.F. Drège (1794–1881) from the Albany District of Eastern Cape. This species was distinguished by Candolle from his [mis]application of the name *Cenia sericea* by its villous rather than canescent vestiture and in having the rays reddish beneath. Both of these features are variable within the coastal taxon, which may be densely to more sparsely villous, with the rays yellow on both surfaces or partly or completely flushed purple beneath. The taxon was subsequently reduced to a variety of *Cenia sericea* sensu Harvey (1865). We have examined the syntypes of *Cenia discolor* and concur that they represent the coastal taxon treated under the name *Cenia sericea* by Candolle (1838) and Harvey (1865), displaying the typical lax perennial habit and villous, bipinnatisect leaves running onto the base of the apically inflated peduncle, and with shortly radiate capitula. The name *Cenia discolor* is therefore available for this taxon and we make the necessary combination in *Cotula*. We select the Verreaux collection as the lectotype as being the only one unquestionably linked to the name by Candolle.

One final name that is relevant here is Candolle's *Cenia pectinata* DC. (1838), based on a collection of C.F. Ecklon's from Cape Recief. Candolle's knowledge of this species was incomplete, critically the nature of the marginal florets, and Harvey (1865) was similarly ignorant. Ecklon's identification of the specimens as *Lidbeckia pectinata* is strong evidence that the species was radiate but, more decisively, we have been able to examine an isotype in the Stockholm herbarium and confirm that the species is clearly radiate. Harvey (1865) distinguished *Cenia discolor* and *Cenia pectinata* primarily on the colour and density of the vestiture, as well as the shape of the leaf lobes and the general size of the plant, with *Cenia discolor* characterised by slender leaf lobes covered with close-lying, pale hairs and *Cenia pectinata* a more robust species with shorter and broader leaf lobes and a looser, foxy pubescence. Both species were known to him from very few collections, namely the type of *Cenia pectinata* and three collections of *Cenia discolor*. We have investigated the two variants in the field. Both taxa occur along the coast within the spray zone. We found that plants



**Fig. 1.** *Cotula sericea*, Compton 10065 (NBG). (A) habit, showing rhizomatous growth and leafless, scapose peduncles; (B) leaf; (C) capitulum; (D) involucre bract; (E) central floret; (F) two anthers; (G) stigmatic branches; (H) peripheral cypselum with corolla attached, face and side view. Scale bar: A, 10 mm; B, 2.5 mm; C, 1.5 mm; D, 0.75 mm; E, H, 1 mm; F, G, 0.5 mm. Artist: John Manning.

matching the type of *Cenia pectinata* (Fig. 3B) favoured calcium rich sandy soils whereas those matching *Cenia discolor* were recorded from more rocky situations. We are unable, however, to identify any differences between them apart from the more compact habit and thicker leaves with denser vestiture of *Cenia pectinata*, and we conclude that it represents an extreme maritime ecotype of *Cenia discolor*. We accordingly treat them as conspecific under the name *Cotula discolor*.

The replacement name *Cotula mariae* Bremer and Humphries (1993) was proposed as a purely nomenclatural action when *Cenia pectinata* DC. was transferred to that genus, the earlier name *Cotula pectinata* Hook.f. precluding its transfer to *Cotula*.

***Cotula discolor* (DC.) J.C. Manning & Mucina, comb. nov.** *Cenia discolor* DC., Prodomus systematis naturalis regni vegetabilis 6: 82 (1838), *Cenia sericea* var. *discolor* (DC.) Harv.: 185 (1865). Type: South Africa, 'Cap. Bonae-Spei', Verreaux s.n. (G-DC00322967 [pp]-digital image!, lecto., designated here; P000111240—JSTOR image!, isolecto.). [Syntype: South Africa, Albany, Drège 5821 (G-DC00322967 [pp]-digital image!, P000111239—JSTOR image!, PRE!, syn.)]

*Cenia pectinata* DC.: 83 (1838), **syn. nov.** *Cotula mariae* Bremer & Humphries: 158 (1993) [as a replacement name, non *Cotula pectinata* Hook.f.]. Type: South Africa, [Eastern Cape], Algoa Bay, Cape Recife, Feb. 1830, Ecklon s.n. (G-DC, holo.—microfiche!; S [S-G-1260]—JSTOR image!, iso.).

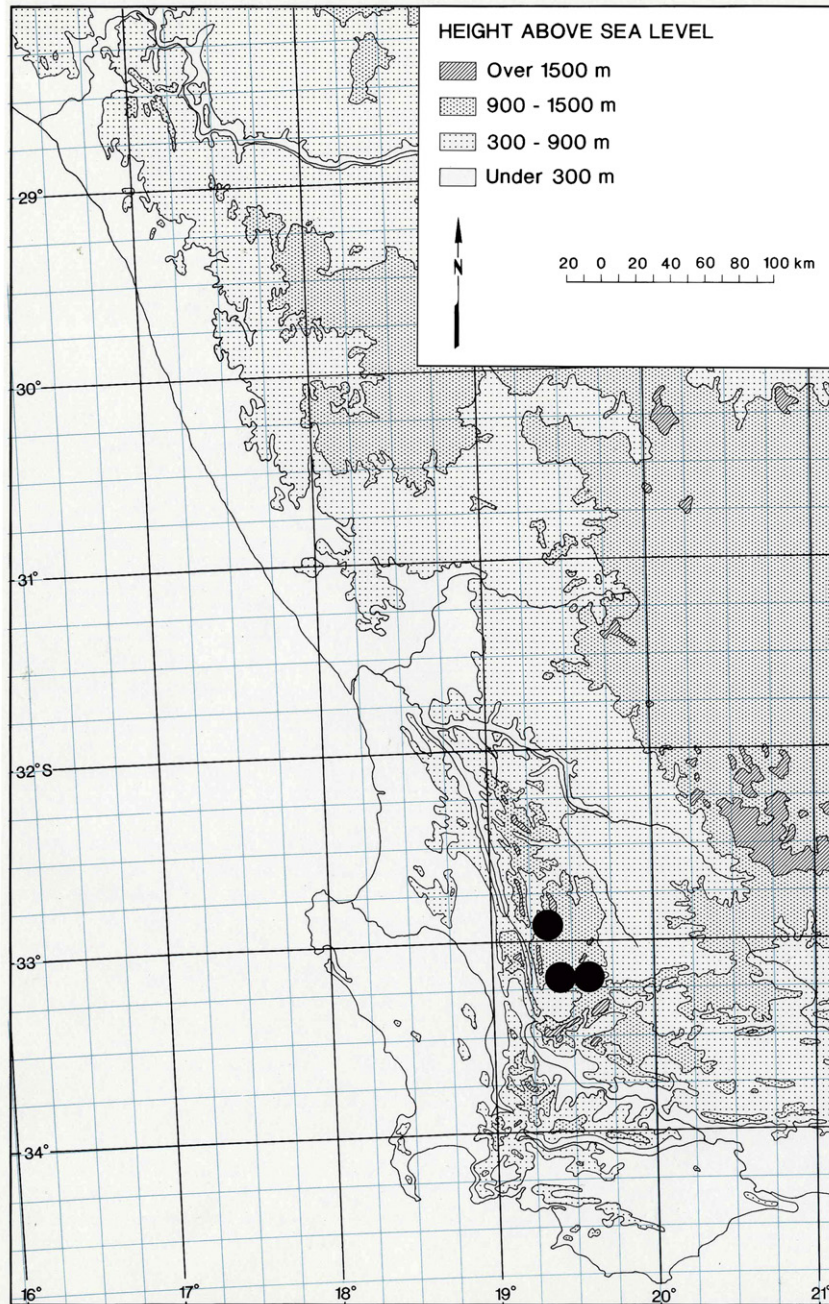


Fig. 2. Distribution of *Cotula sericea*.

*Cenia sericea* sensu DC.: 82 (1838), pp. et Harv.: 185, pp. [excl. type]  
*Cotula sericea* sensu auct., non. L.f.

### 3.2.1. Selected specimens examined

EASTERN CAPE.—**3228** (Butterworth): East London, Gonubie Springs, (–CC), 11 Apr. 1942, *Compton 13114* (NBG). **3323** (Willowmore): Nature's Valley floodplain, Sout River Mouth, (–DC), 9 Apr. 1981, *Parsons 208* (NBG). **3325** (Port Elizabeth): Port Elizabeth, *Zeyher s.n.* (SA); Oct. 1883, *Tyson s.n.* (PRE, SAM); Port Elizabeth, coast in front of Seaview Hotel, 26 Nov. 2005, *Mucina 261105/09 & 261105/10* (NBG). **3327** (Peddie): East London, Kidd's Beach, (–BB), 1 Feb. 1957, *Taylor 5591* (NBG). **3423** (Knysna): Tsitsikamma National Park, Elandsrivier Mouth, (–BB), 1 June 2010, *Burring s.n.* (NBG); Storm's River Mouth, (–BB), 26

Nov. 1950, *Hall 210* (NBG). **3424** (Humansdorp): Oubosstrand near Humansdorp (–AB), near the sea level, 3 Oct. 1963, *Levyns 11468* (BOL); Aasvoëlkrans, east of Oubosstrand, (–AB), between rocky coast and sandy-limestone escarpment, 10 Mar. 1979, *Taylor 9968* (NBG).

WESTERN CAPE.—**3422** (Mossel Bay): Mossel Bay, (–AA), Aug. 1912, *Rogers 4135* (NBG). **3423** (Knysna): E end of Noetzie beach near Knysna, (–AA), rocky littoral, 10 Nov. 1979, *Taylor 10136* (NBG); Keurboom's River, near sea, (–AB), 11 Oct. 1928, *Gillett 1394* (NBG).

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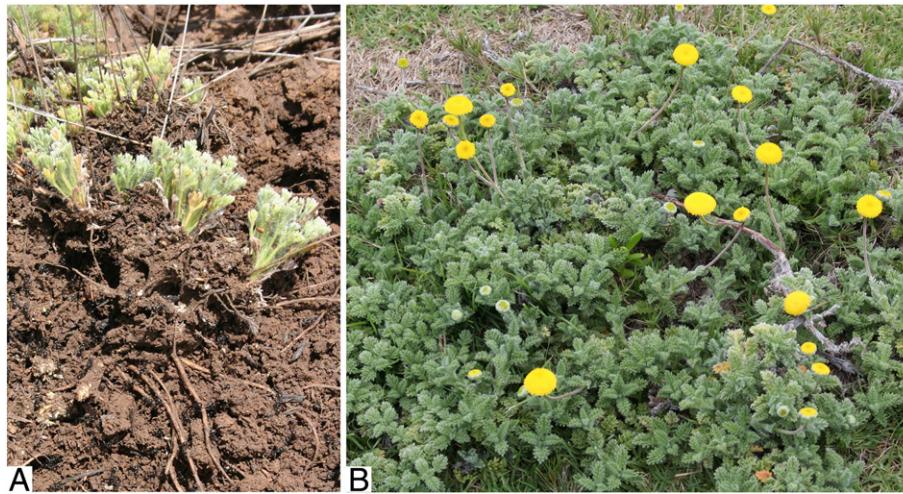


Fig. 3. Habit of *Cotula sericea* and *C. discolor*. (A) *C. sericea*, Mucina 231107/01 (NBG); (B) *C. discolor*, Mucina 261105/09 (NBG).

collecting permits; and the curator and staff, Conservatoire Botanique de la Ville de Genève, for supplying electronic images of *Cenia discolor* type material.

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