

## *Maireana brevifolia* (Chenopodiaceae: Camphorosmeae), a new naturalized alien plant species in South Africa

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### ABSTRACT

We describe and discuss the distribution of a new, naturalized alien species, *Maireana brevifolia* (R.Br.) Paul G.Wilson (Chenopodiaceae), a native of Australia, in the western regions of South Africa. First discovered near Worcester, Western Cape in 1976, the species is now established in disturbed karoo shrubby rangelands, along dirt roads and on saline alluvia, from northern Namaqualand to the western Little Karoo. In the South African flora, *M. brevifolia* is most easily confused with the indigenous *Bassia salsoloides* (Fenzl) A.J.Scott, from which it is distinguished by the flat to cup-shaped and almost glabrous perianth with woolly-ciliate lobes, and the hardened and winged fruiting perianth.

### INTRODUCTION

Several ecological groups of Australian alien plants have been incorporated into the South African flora, including a number of Fabaceae, predominantly *Acacia* species (most importantly *A. cyclops* A.Cunn. ex G.Don, *A. longifolia* (Andrews) Willd., *A. mearnsii* De Wild., *A. melanoxylon* R.Br., *A. pycnantha* Benth., *A. saligna* (Labill.) H.L.Wendl.), and several species of Chenopodiaceae. These vary from herbaceous weeds such as *Dysphania cristata* (F.Muell.) Mosyakin & Clemants (= *Chenopodium cristatum* F.Muell.), *D. pumilio* (R.Br.) Mosyakin & Clemants (= *Chenopodium pumilio* R.Br.) to weeds of karoo shrublands and disturbed sites in the arid biomes of southern Africa, including several notorious species of *Atriplex*, namely *A. eardleyae* Aellen, *A. lindleyi* Moq., *A. nummularia* Lindl. and *A. semibaccata* R.Br. (Goldblatt & Manning 2000; Makgaka 2003). *Atriplex nummularia* in particular has been cultivated widely, especially on heavy alluvial soils in South Africa as a dry-season fodder plant (L. Mucina pers. obs.). In many places (especially in the Little Karoo), the species has escaped cultivation to become an established weed, especially on alluvia of intermittent semi-desert rivers.

During the preparation of an account for the Chenopodiaceae in *Plants of the Greater Floristic Region 2: the Extra Cape flora* (Mucina & Snijman ined.), it became apparent that yet another adventive species of Chenopodiaceae, native to Australia, is present in several places in the western regions of South Africa.

### *Maireana brevifolia*

*Maireana brevifolia* (R.Br.) Paul G.Wilson is the newest addition in Chenopodiaceae to the alien flora of the South African semi-deserts (Figure 1B). It has been found to become established in disturbed karoo shrubby rangelands, along dirt roads, and on saline allu-

via. The latter habitat is that preferred by *M. brevifolia* in its homeland—Australia. In its native range, it covers a large distribution area (Figure 1A) characterized by ‘transitional’ rainfall (where the influence of western frontal systems meets that of poorly predictable cyclonic summer rainfall). The footprint of the distribution area of this species marks the extent of unique temperate *Eucalyptus* open woodlands that have been cleared, especially in many parts of Western Australia, South Australia, New South Wales, southern Queensland and northern Victoria. The native status of this species in the Northern Territory needs revisiting. This species has a moderate salinity and waterlogging tolerance and prefers heavy clay or sandy-clay alluvial soils. In Western Australia it has been found to be one of the pioneers of recolonization of abandoned salinized pastures.

*Maireana brevifolia* is also an established weed in Chile (Marticorena 1997), the Middle East (Danin 2000b) and the Canary Islands (Brandes 2006). Climate-niche modelling (Figure 1C) predicts that *M. brevifolia* could establish with high probability throughout the Mediterranean, around the Gulf of Mexico, eastern Argentina and neighbouring countries, as well as southern China.

*Maireana brevifolia* might have been introduced to South Africa when targeted as potential dry-season fodder or accidentally as seed admixtures with *Atriplex nummularia*. The first herbarium record for the species in South Africa, made in 1976, is from the Worcester area, Western Cape. With her knowledge of the Western Australian flora, the late Pauline Bond, formerly of the Compton Herbarium, recognised the collection as an alien species and was the first to identify the plants as *M. brevifolia*. Since then the species has been collected four more times, once in Namaqualand and on three separate occasions in the Western Cape, dating from the late 1990s onwards. The identity of two of these collections has been independently confirmed by R.J. Chinnock of the State Herbarium of South Australia, Adelaide, and H. Freitag, Kassel, Germany.

In Australia, *Maireana brevifolia* has been used to ameliorate salt-laden pastures (Runciman & Malcolm 1991; Barrett-Lennard & Malcolm 1995; Barrett-Len-

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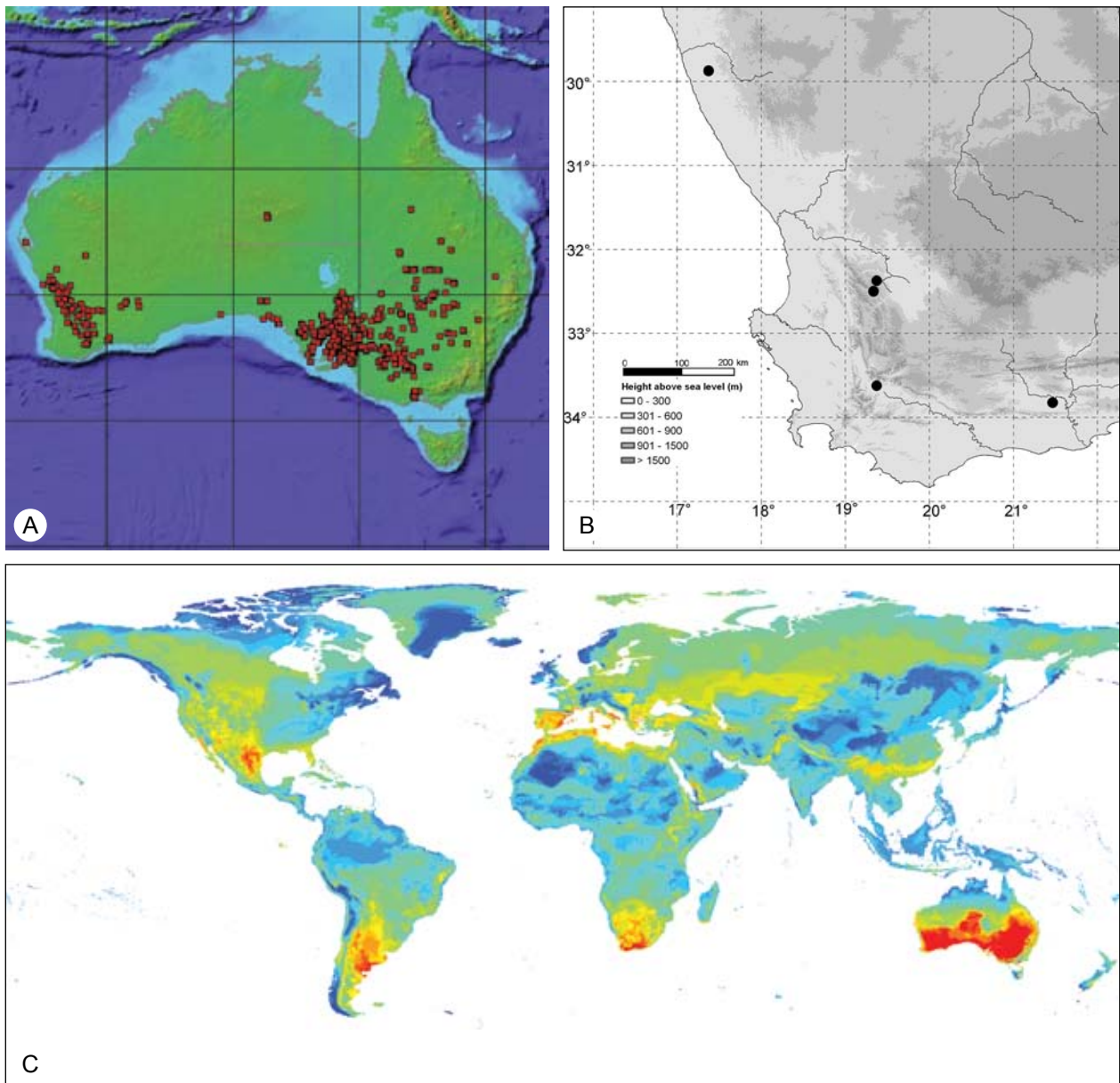


FIGURE 1.—A, distribution map of *Maireana brevifolia* in Australia (courtesy of Australian Virtual Herbarium, <http://avh.rbgb.vic.gov.au/avh/>); B, distribution map of *M. brevifolia* in South Africa (original); C, modelled distribution of *M. brevifolia* using Australian localities (stored by [www.gbif.org](http://www.gbif.org)) as basis of model. Openmodeller generated the probability distribution using Envelope Score Algorithm (see <http://openmodeller.sourceforge.net> for computation details). Colour scheme (spanning hot/red colours to cool/blue colours) used in map designates a gradient of probability of high vs low probability of occurrence of *M. brevifolia* under the given climate-niche scenario.

nard *et al.* 2003) and with less success, also mine spoil dumps (Jefferson 2004; Jefferson & Pennacchio 2005). Outside Australia, *M. brevifolia* has been introduced for saline soil improvement and dry-season fodder production in Pakistan (Ilyas *et al.* 2000), Iraq (Abdul-Halim *et al.* 1990) and Israel (Danin 2000a).

***Maireana brevifolia* (R.Br.) Paul G. Wilson** in *Nuytsia* 2: 22 (1975). Type: Australia, South Australia, Bay XI, south coast, *R. Brown* (BM, holo.).

*Kochia brevifolia* R.Br.: 409 (1810).

Succulent-leaved shrub, up to 1 m high, with mostly erect, slender, striate, sparsely woolly branches. *Leaves* alternate, obovoid to narrowly fusiform, (1–)2–5 mm long, fleshy, narrowed into a short petiole, glabrous.

*Flowers* bisexual, solitary, ebracteolate, glabrous except for woolly-ciliate lobes. *Fruiting perianth* glabrous; tube shallowly hemispherical, thin-walled,  $\pm 2$  mm in diam.; wings 5, rarely absent, equal, horizontal, thin, fan-shaped, 2–3 mm long, glabrous, with delicate brown venation when dry, with pale to dark pink tint; perianth lobes thick and fleshy, sharply demarcated from wings. (Description based on Wilson 1984). *Flowering time*: (Aug.–)Nov. to Apr. Figure 2.

*Common names in Australia*: Small-leaf Bluebush, Eastern Cotton Bush, Yanga Bush. None is yet known in South Africa.

*Distribution in South Africa*: to date *Maireana brevifolia* has been recorded from Namaqualand, between Anenous and Komaggas, on the lower slopes of the

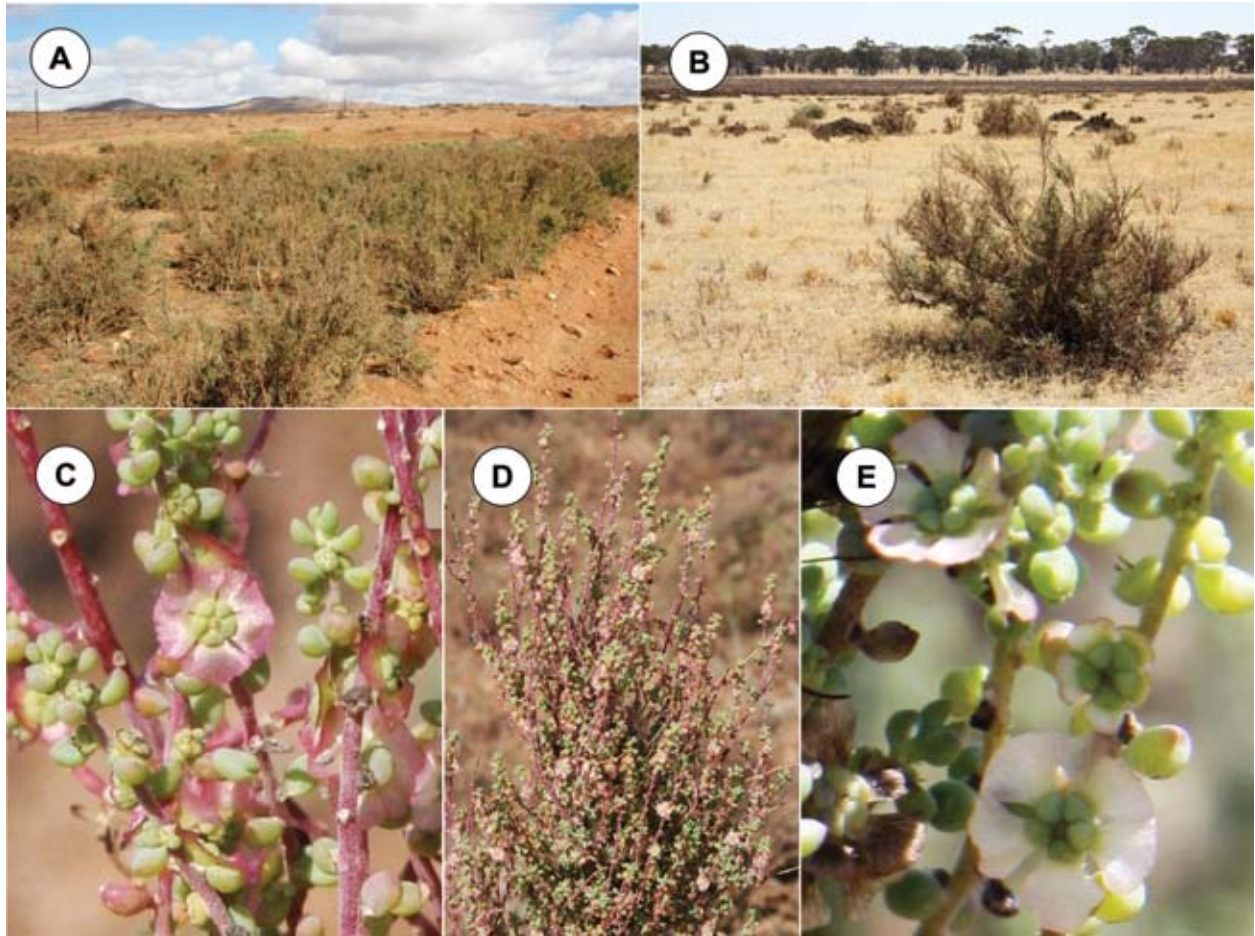


FIGURE 2.—*Maireana brevifolia*, habitat and habit: A, typical habitat of *M. brevifolia*—disturbed edge of dirt road crossing a shallow depression (alluvium of intermittent river) near Komaggas (Namaqualand, South Africa); B, extensively used pasture on saline alluvium near Kondinin (Western Australia) with a bush of *M. brevifolia* in foreground and scattered individuals in the rear. C, D, *Mucina 280407/03 MJG, NBG*; from Komaggas, South Africa: C, form with deep pink fruit; D, erect-branched habit of *M. brevifolia* bushes. E, *Mucina 102010/03 Curtin Univ. Herbarium* from Corrigin, Western Australia: form with pale pink fruit. All photographs: L. Mucina.

eastern Cederberg Mtns bordering on the Tanqua Karoo, the Worcester-Robertson Karoo and the western Little Karoo. As long as disturbed habitats such as those formed along dirt roads and on saline alluvia are available for this colonizer, *M. brevifolia* will persist as an established alien in the South African flora.

*Notes:* the genus *Maireana* is native to mainland Australia and has  $\pm$  57 species. *M. brevifolia* is the only species of the genus known to have been introduced into South Africa so far. Within the South African flora, *Maireana* is most closely related to *Bassia* All., which is the only native genus belonging to tribe Camphorosmeae (*sensu* Akhiani *et al.* 2007). *Maireana* is distinguished from *Bassia* by flowers that are usually solitary or in pairs in the leaf axils, the flat to cup-shaped and mostly glabrous perianth (except in *M. brevifolia* where the lobes are woolly-ciliate), and the hardened and winged fruiting perianth. In contrast, *Bassia* has solitary flowers or flowers arranged in spicate inflorescences, an urn-shaped perianth, and the fruiting perianth has spine-like or tubercle-like appendages or membranous, scarios wings. *M. brevifolia* is most easily confused with *B. salsoloides* (Fenzl) A.J.Scott, commonly known as the *basterinkbos*, which is widespread in sandy, alluvial soils along water courses and seasonal washes from the Free State in the northeast, through the central Karoo to

Matjiesfontein, Western Province, in the southwest. *B. salsoloides* has linear to filiform, succulent leaves that are  $\pm$  pubescent, flowers borne in tight, short, spike-like clusters, a pubescent perianth, and a fruiting perianth that enlarges into short, firm, brown-streaked wings, with irregularly toothed margins.

#### *Specimens examined*

NORTHERN CAPE.—2917 (Springbok): Namaqualand, northwest of Komaggas, sandy-clayey saline donga, 29°17'51.76"S, 17°28'10.02"E, (–CD), 28 Apr. 2007, L. Mucina 280407/05 (MJG).

WESTERN CAPE.—3219 (Wuppertal): Matjies River Nature Reserve, Upland Succulent Karoo, stony soil, 760 m, 32°29.90'S, 19°20.30'E, (–AD), 21 Nov. 1999, A.B. Low 5835 (NBG); Matjies River Nature Reserve, roadsides and valley bottom on old fields, on sandy or loamy soils, 32°30'03"S, 19°20'18"E, (–CB), Apr. 2002, P.M. Holmes *s.n.* (NBG). 3319 (Worcester): Karoo Garden, Worcester, in *Euphorbia mauritanica* patches, 300 m, (–CB), Mar. 1976, M.B. Bayer 149 (NBG). 3321 (Ladismith): 0.4 km east of T-junction of R327 with connecting road to R323 just west of Langberg [Langeberg], abundant along roadsides in *Acacia karroo* / Aizoaceae low shrubland, on stony brown loam,  $\pm$  33°49'30"S, 21°28'07"E, (–CD), 21 Aug. 1998, R.J. Chinnock 9194 (NBG).

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