

## New combinations in the genus *Dysphania* (Chenopodiaceae)

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### Abstract

Shepherd, K.A. & Wilson, P.G. New combinations in the genus *Dysphania* (Chenopodiaceae). *Nuytsia* 18: 267–272 (2008). A long standing recognition of a possible affinity between *Dysphania* R.Br. and *Chenopodium* L. subg. *Ambrosia* A.J.Scott has been corroborated by molecular phylogenetic evidence. While the North American species of *C.* subg. *Ambrosia* have been transferred to *Dysphania* this has not occurred elsewhere. In light of this, new combinations are made here for the Australian and New Zealand species of *C.* subg. *Ambrosia*. A key to the Australian species of *Dysphania* is provided.

### Introduction

*Dysphania* R.Br. (1810) is recognised in the *Flora of Australia* (Wilson 1984b) as a small genus comprising ten species endemic to mainland Australia. These aromatic herbs are named from the Greek *dysphanes* (obscure, scarcely visible) apparently in reference to their minute flowers which occur in compact, cymose clusters. The members of *Dysphania* are also characterised by the presence of sessile glands or simple and acuminate, multicellular, glandular hairs (Wilson 1983). The genus has at various times been included under sections within the genus *Chenopodium* L. (*C.* sect. *Dysphania* (R.Br.) Aellen and *C.* sect. *Tetrasepala* Aellen) (Aellen 1930; Black 1934), placed in the Illecebraceae (Hooker 1880), the Caryophyllaceae (Pax 1889) and even recognised as a distinct family, Dysphaniaceae (Pax 1927; Pax & Hoffman 1934; Aellen 1961; Eckhardt 1964; Airy Shaw 1966; Scott 1978).

In his revision of the Australian tribe Chenopodieae, Wilson (1983) noted that *Dysphania* showed an affinity with representatives of *Chenopodium* subg. *Ambrosia* A.J.Scott in having a similar habit and inflorescence type, and in the shared presence of glandular and simple septate hairs, as opposed to the mealy indumentum of bladder-like hairs typical of subg. *Chenopodium*. Two of the five sections recognised in subg. *Ambrosia* occur in Australia (sect. *Orthosporum* R.Br. and sect. *Ambrina* Hook.f.). Sect. *Orthosporum* (Table 1) is endemic to Australia and New Zealand and has flowers with 4–5 tepals and a single stamen, characters also present in *Dysphania*. It differs from *Dysphania* in having lenticular seeds with a hippocrepiform embryo curved around the apex, as opposed to the subglobular to globular seeds with a lateral or basal embryo typical of *Dysphania* (Wilson 1983). Sect. *Ambrina*, represented in Australia by introduced species, differs from *Dysphania* and all other Australian species of *Chenopodium* by their characteristic smell and by the distinctive geniculate hairs on the ovary (Wilson 1983) (Table 1). Later, Wilson (1987) proposed that the two introduced species in sect. *Ambrina* should in fact be transferred to a reinstated *Roubieva* Moq. However, Weber (1985) had come to a similar conclusion just a year earlier and had transferred sect. *Ambrina* to *Teloxys* Moq. instead.



Weber (1985) also implied that the Australian species of sect. *Orthosporum* should be included in the reinstated *Teloxys*. Wilson (1987) disagreed, again reiterating the apparent close relationship between the species of *Chenopodium* sect. *Orthosporum* and *Dysphania*. Wilson concluded that these species could either be transferred to *Dysphania*, included in a reinstated *Orthosporum* (R.Br.) T.F.L.Nees, or *Teloxys* and sect. *Orthosporum* could be included in an expanded *Dysphania*.

No nomenclatural recombinations were actually made until Mosyakin and Clemants (2002) addressed the status of *Chenopodium* in North America in preparation for their treatment for the *Flora of North America north of Mexico* (Clemants & Mosyakin 2003). The authors acknowledged the long-recognised affinity of subg. *Ambrosia* with the genus *Dysphania* and transferred the North American species (both endemic and introduced; Table 1) to *Dysphania*. Mosyakin and Clemants (2002) described a number of morphological characters that defined the newly expanded *Dysphania* including the types of glandular hair, leaf shape, venation and inflorescence, and a tendency towards more vertical seeds.

**Table 1.** Australian and New Zealand species of *Chenopodium* subg. *Ambrosia* now placed in *Dysphania* (\*introduced in Australia).

Section	Species	Distribution	Current name
<i>Orthosporum</i>	<i>Chenopodium carinatum</i> R.Br.	Qld, NSW & Vic, cosmopolitan weed	<i>Dysphania carinata</i> (R.Br.) Mosyakin & Clemants
	<i>Chenopodium cristatum</i> (F.Muell.) F.Muell.	Widespread across Australia, south of 20° latitude; cosmopolitan weed	<i>Dysphania cristata</i> (F.Muell.) Mosyakin & Clemants
	<i>Chenopodium melanocarpum</i> (J.M.Black) J.M.Black	Widespread across Australia, south of 20° latitude	<i>Dysphania melanocarpa</i> (J.M.Black) Paul G.Wilson & K.A.Sheph.
	<i>Chenopodium melanocarpum</i> f. <i>leucocarpum</i> (Aellen) Paul G.Wilson	north-west WA, central SA, eastern QLD, NSW & Vic	<i>Dysphania melanocarpa</i> f. <i>leucocarpa</i> (Aellen) Paul G.Wilson & K.A.Sheph.
	<i>Chenopodium pumilio</i> R.Br.	southern Australia, occasional weed in northern Australia; cosmopolitan weed	<i>Dysphania pumilio</i> (R.Br.) Mosyakin & Clemants
	<i>Chenopodium pusillum</i> Hook.f.	North and South Island NZ	<i>Dysphania pusilla</i> (Hook.f.) Paul G.Wilson & K.A.Sheph.
	<i>Chenopodium saxatile</i> Paul G.Wilson	Widespread across arid zone WA	<i>Dysphania saxatilis</i> (Paul G.Wilson) Paul G.Wilson & K.A.Sheph.
	<i>Chenopodium truncatum</i> Paul G.Wilson	Qld, NSW, SA & NT	<i>Dysphania truncata</i> (Paul G.Wilson) Paul G.Wilson & K.A.Sheph.
<i>Ambrina</i>	* <i>Chenopodium ambrosioides</i> L.	Tropical America; cosmopolitan weed; disturbed sites coastal Australia	<i>Dysphania ambrosioides</i> (L.) Mosyakin & Clemants
	* <i>Chenopodium multifidum</i> L.	South America; cosmopolitan weed; disturbed sites coastal Australia	<i>Dysphania multifida</i> (L.) Mosyakin & Clemants



A molecular phylogenetic analysis of Amaranthaceae and Chenopodiaceae based on sequence variation in the cpDNA *rbcL* gene (Kadereit *et al.* 2003) included *Dysphania glomulifera* (Nees) Paul G. Wilson, two representatives of subg. *Ambrosia* (the Australian *Chenopodium cristatum* (F. Muell.) F. Muell. (sect. *Orthosporum*) and *C. botrys* L. (sect. *Botryoides*)), *Teloxys aristata* (L.) Moq., from central Asia, and a number of representatives from subg. *Chenopodium*. In this analysis the Australian species *C. cristatum* was placed sister to *Dysphania* with 73% maximum parsimony (MP) bootstrap support, forming a lineage sister to *C. botrys* with 95% MP bootstrap support. *Teloxys* was placed sister to the *Dysphania*+subg. *Ambrosia* clade (although without bootstrap support), forming a clade which the authors named Chenopodieae III (Figure 2, Kadereit *et al.* 2003). This clade provides evidence for the affinity of the glandular species of *Teloxys* (formerly *Chenopodium* subg. *Ambrosia* sect. *Ambrina*), *Chenopodium* subg. *Ambrosia* sect. *Orthosporum* and *Dysphania*. However, this study included very few representatives and there was no bootstrap support at the base of the Chenopodieae III clade (Kadereit *et al.* 2003).

Wilson (1987) considered that the North American species of *Chenopodium* sect. *Ambrina* may be generically distinct from *Chenopodium* sect. *Orthosporum* + *Dysphania*, but due to the limited availability of molecular sequence data this cannot be confirmed (or conversely, denied). We believe, however, that even with further analysis of sequence data from a broader sampling across all the sections now included in *Dysphania s.l.*, the close relationship between the species currently in *Chenopodium* sect. *Orthosporum* and *Dysphania s.s.* will not change. Therefore, new combinations made through transferring *Chenopodium* sect. *Orthosporum* to *Dysphania* are also unlikely to change in the future and so we make them here.

Mosyakin and Clemants (2002) also made the combination *Dysphania anthelmintica* (L.) Mosyakin & Clemants based on *Chenopodium anthelminticum* L. This taxon was considered by Wilson (1984a) to be a subspecies of *C. ambrosioides* L. and an assessment of the type material is required to determine its status.

Several nothotaxa are included in *Chenopodium* sect. *Orthosporum* (Wilson 1984a), but these names are not transferred to *Dysphania* sect. *Orthosporum* here because the extensive introgressive hybridisation between most of the species within this section inhibits their taxonomic resolution. We believe it more appropriate to refer to these nothotaxa by their hybrid formulae, e.g. *Chenopodium*  $\times$  *trigonocarpum* Aellen should be cited as *Dysphania cristata*  $\times$  *D. melanocarpa*.

It should be noted that the orthography '*Orthospora*', used by Mosyakin and Clemants (2002) and by Clemants and Mosyakin (2003) in their sectional classification of *Dysphania*, is incorrect. The sectional epithet was first published by Brown (1810) as *Orthosporum*, which he had treated as a noun having the same form as a generic name; therefore its spelling does not alter regardless of the gender of the generic name.

### New Combinations in *Dysphania* sect. *Orthosporum*

***Dysphania melanocarpa* (J.M. Black) Paul G. Wilson & K.A. Sheph., *comb. nov.***

*Chenopodium carinatum* var. *melanocarpum* J.M. Black, *Trans. & Proc. Roy. Soc. S. Australia* 46: 566 (1922); *Chenopodium melanocarpum* (J.M. Black) J.M. Black, *Trans. & Proc. Roy. Soc. S. Australia* 58: 173 (1934). Type: Broken Hill, N.S.W., Sep. 1918, per T.G.B. Osborn (lecto: AD, *fide* Wilson 1983).



**Dysphania melanocarpa** f. **leucocarpa** (Aellen) Paul G. Wilson & K.A. Sheph., *comb. nov.*

*Chenopodium carinatum* f. *leucocarpum* Aellen, *Verh. Naturf. Ges. Basel* 44: 313 (1933); *Chenopodium melanocarpum* f. *leucocarpum* (Aellen) Paul G. Wilson, *Nuytsia* 4: 176 (1983). Type: Minderoo, W.A., Oct. 1905, A. Morrison (neo: PERTH, fide Wilson 1983).

**Dysphania melanocarpa** (J.M. Black) Paul G. Wilson & K.A. Sheph. f. **melanocarpa**

**Dysphania truncata** (Paul G. Wilson) Paul G. Wilson & K.A. Sheph., *comb. nov.*

*Chenopodium truncatum* Paul G. Wilson, *Nuytsia* 4: 177 (1983). Type: 65 miles (105 km) W of Henbury Homestead, N.T., 10 Dec. 1968, P.K. Latz 255 (holo: AD; iso: CBG, NT).

**Dysphania saxatilis** (Paul G. Wilson) Paul G. Wilson & K.A. Sheph., *comb. nov.*

**Chenopodium saxatile** Paul G. Wilson, *Nuytsia* 4: 179 (1983). Type: 24 km east of Depot Springs Homestead, W.A., 27 Aug. 1970, P.G. Wilson 8909 (holo: PERTH; iso: K).

**Dysphania pusilla** (Hook.f.) Paul G. Wilson & K.A. Sheph., *comb. nov.*

**Chenopodium pusillum** Hook.f., *Handb. N. Zeal. Fl.* 1: 231 (1864). Type: Northern Island, New Zealand: shores of the east coast and sandy shores of Lake Taupo, abundant in native cultivated ground, *Colenso s.n.* (holo: K n.v.).

### Amendments to the *Flora of Australia* Key

This key is a combination of the *Flora of Australia* keys to the species of *Dysphania* (Wilson 1984: 154) and the species of *Chenopodium* from couplet 1: (Wilson 1984: 135) with minor amendments.

1. Tepals 1–4
2. Tepals 1–3
3. Flowers in axillary clusters
4. Tepals of lateral flowers of clusters 1 or 2; seed erect, ellipsoidal to obovoid or laterally flattened
5. Tepals united at base; tepals shed with seed enclosed
6. Seed lenticular, the embryo curved around its base.....**D. valida**
- 6: Seed obovoid or ellipsoidal, the embryo lateral ..... **D. glomulifera**
- 5: Tepals free; seed and tepals shed separately
7. Seed strongly flattened laterally (usually slightly twisted),  
± obovate; pericarp almost smooth.....**D. platycarpa**
- 7: Seed ellipsoidal, obovoid or lenticular; pericarp smooth or glandular-papillate
8. Pericarp smooth, punctulate or minutely papillate; seed ellipsoidal  
to obovoid or lenticular ..... **D. glomulifera**
- 8: Pericarp prominently papillate; seed asymmetrically narrowly obovoid,  
the embryo side flat .....**D. glandulosa**
- 4: Tepals 3; seed turnip-shaped to subglobular.....**D. littoralis**



- 3: Flowers in spike-like inflorescences
  - 9: Seed compressed-globular; embryo oblique to erect ..... **D. sphaerosperma**
  - 9: Seed ellipsoidal or broadly pear-shaped, erect; embryo lateral and basal
    - 10: Tepals free, rounded or inconspicuously keeled on back ..... **D. plantaginella**
    - 10: Tepals united into a hard cup-shaped tube in lower half, prominently and horizontally keeled ..... **D. simulans**
- 2: Tepals 4
  - 11: Plant erect with one main stem; seed dull (rarely glossy), almost globular
    - 12: Inflorescence spike-like, composed of compact axillary cymes ..... **D. rhadinostachya**
    - 12: Inflorescence paniculate, composed of open dichasia ..... **D. saxatilis**
  - 11: Plant prostrate or decumbent, many stems from the base; seed glossy, compressed globular ..... **D. kalpari**
- 1: Tepals 5
  - 13: Stamens 5; pericarp with geniculate glandular hairs
    - 14: Leaves serrate; seed horizontal to oblique ..... **D. ambrosioides**
    - 14: Leaves pinnatisect; seed erect ..... **D. multifida**
  - 13: Stamens 1 or 2; pericarp glabrous, minutely puberulous or papillose
    - 15: Tepals strongly crested
      - 16: Perianth rostrate at apex; tepals free ..... **D. cristata**
      - 16: Perianth truncate at apex; tepals united ..... **D. truncata**
    - 15: Tepals rounded to acute on back or keeled
      - 17: Tepals keeled at least towards apex ..... **D. carinata**
      - 17: Tepals rounded on back
        - 18: Tepals firmly united in lower half, completely covering fruit, pale fawn or black ..... **D. melanocarpa**
        - 19: Fruiting perianth black ..... **D. melanocarpa** f. **melanocarpa**
        - 19: Fruiting perianth pale fawn ..... **D. melanocarpa** f. **leucocarpa**
        - 18: Tepals free to near base, not completely covering the fruit, white ..... **D. pumilio**

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