Nuytsia The journal of the Western Australian Herbarium

28: 141–146 Published online 12 April 2017

Taxonomic notes on *Asterolasia* (Rutaceae) in Western Australia to inform conservation

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Abstract

Wege, J.A. Taxonomic notes on *Asterolasia* (Rutaceae) in Western Australia to inform conservation. *Nuytsia* 28: 141–146 (2017). Following examination of collections at the Western Australian Herbarium, the Threatened species *Asterolasia nivea* (Paul G.Wilson) Paul G.Wilson is synonymised under *A. grandiflora* (Hook.) Benth. A revised description is provided for *A. grandiflora*, a geographically restricted species that will remain listed as Priority Four under Department of Parks and Wildlife Conservation Codes for Western Australian Flora despite its expanded circumscription. *Asterolasia pallida* Benth. subsp. *hyalina* Paul G.Wilson, a distinctive taxon previously only known from Dryandra State Forest, is raised to species level and *A.* sp. Kalgan River (S. Barrett 1522), which is listed as Threatened in Western Australia, is treated as synonymous. While the latter action greatly expands the known range of *A. hyalina* (Paul G.Wilson) Wege, this taxon retains its conservation ranking of Priority Two. A key to species of *Asterolasia* F.Muell. in Western Australia is provided.

Introduction

This paper serves to clarify the taxonomic status of *Asterolasia nivea* (Paul G.Wilson) Paul G.Wilson and *A.* sp. Kalgan River (S. Barrett 1522), both of which are listed as Threatened in Western Australia (Smith 2017), with the former also listed as Vulnerable under the federal *Environment Protection and Biodiversity Conservation Act 1999*. Their assessment has been made possible by the taxonomic framework provided by Wilson (2013) and the survey work, collections and observations of science and conservation personnel and volunteers.

Asterolasia nivea = *A. grandiflora* (Hook.) Benth.

Asterolasia nivea was originally defined as distinct from *A. grandiflora* on account of its narrowly oblong to oblong leaves (*cf.* ovate to elliptic in *A. grandiflora*) and its smaller (8–10 mm long), white petals (*cf.* 10–15 mm long and pink to mauve) (Wilson 1980). Few specimens of both species were available for study at the time, with *A. nivea* thought to be restricted to near Bindoon and *A. grandiflora* to the York–Toodyay area. Subsequent collections reflect a more continuous distribution, with Wilson (2013) noting that the two species grade into each other.

Recent examination of an expanded pool of specimens at the Western Australian Herbarium (n = 69) and associated images reveals that leaf shape, and petal size and colour are more variable in *A. grandiflora*

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ISSN 2200-2790 (Online)
ISSN 0085-4417 (Print)

and *A. nivea* than previously documented. For example, there are pink-flowered specimens with petals as short as 6–8 mm (e.g. *R. Davis* 4280, *F. Hort* 1158, *F. Hort* 2029, *H. Seeds* 152), white-flowered specimens with petals as long as 12–13 mm (e.g. *F. Hort* 2005, *L. Talbot s.n.* PERTH 01449125) and collections with variably-sized petals (e.g. 6–13 mm long, *F. Hort* 1158). Plants from populations in Wandoo National Park (Figure 1) and nature reserves near Toodyay and Clackline have been recorded as having either pink or white flowers (*R.J. Cranfield & J.L. Robson* RJC 7828 & 7829; *J. & F. Hort s.n.* PERTH 04958071, Figure 1) or both pink and white flowers (*R.J. Cranfield & J.L. Robson* RJC 7826 & 7827). Leaf size and shape is highly variable between and sometimes within populations. Other differences between Wilson's (2013) descriptions of *A. nivea* and *A. grandiflora*, such as petal shape (elliptic vs ovate) and stamen number (15–20 vs 12–15), are similarly taxonomically uninformative.

Asterolasia nivea is therefore best synonymised under *A. grandiflora*, forming a single, geographically restricted species with a petal hair morphology that is highly distinctive in the genus.

Asterolasia grandiflora (Hook.) Benth., *Fl. Austral.* 1: 352–353 (1863); *Phebalium grandiflorum* Hook., *Icon. Pl.* 8: t. 724 (1848); *Eriostemon grandiflorus* (Hook.) F.Muell., *Fragm.* 1(5): 105 (1859); *Urocarpus grandiflorus* (Hook.) Paul G.Wilson, *Nuytsia* 1: 207 (1971). *Type*: [Western Australia], *J. Drummond* 12 (*holotype*: K 000717293 image!).

Asterolasia nivea (Paul G.Wilson) Paul G.Wilson, *Nuytsia* 6(1): 8 (1987), *syn. nov.*; *Urocarpus nivea* Paul G.Wilson, *Nuytsia* 3(2): 211–213 (1980). *Type*: north of Bindoon, Western Australia [precise locality withheld for conservation reasons], 19 September 1979, *P.G. Wilson* 11704 (*holotype*: PERTH 00998621!; *isotypes*: CANB 297654 image!, K 000717290 image!, MEL 0584109 image!, NSW 778396 image!).

Erect or spreading, open *shrub* or *subshrub c.* 15–60(–80) cm high. *Leaves* shortly petiolate, oblong, elliptic or ovate (sometimes narrowly so), 4–20 mm × 1.5–6(–9) mm, moderately stellate-hairy adaxially when young becoming scabridulous when mature, densely to moderately stellate-hairy abaxially; margins sometimes recurved. *Umbels* terminal or axillary, sessile, 3- or 4-flowered; pedicels 5–17 mm long, with dark yellow or rufous, thick-centred stellate hairs. *Sepals* semicircular to broadly deltate, 0.2–0.3 mm long, glabrous. *Petals* elliptic or ovate, acute, 6–15 × 2.8–9 mm, pale to deep pink or white; abaxial surface closely covered with yellow, thick-centred stellate hairs that form an armour-like cover to the bud, colourless stellate hairs with branches radiating in all directions present near the margins. *Stamens c.* 12–24, glabrous; anthers 1–1.4 mm long, terminal gland not apparent. *Carpels* 2–4, stellate-hairy; style glabrous; stigma lobes fleshy, slightly recurved. *Cocci* with a beak *c.* 2.5–3 mm long. (Figure 1)

Diagnostic features. *Asterolasia grandiflora* can be distinguished from all other members of the genus by the following combination of characters: yellow, thick-centred stellate hairs on the abaxial surface of the petals that form an armour-like cover to the bud; and two to four carpels.

Selected specimens. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 30 Aug. 1990, *R.J. Cranfield & J.L. Robson* RJC 7826 & 7827 (PERTH); 31 Aug. 1990, *R.J. Cranfield & J.L. Robson* RJC 7828 & 7829 (PERTH); 16 Oct. 2012, *A.D. Crawford* ADC 2215 (PERTH); 8 Oct. 1997, *R. Davis* 4280 (PERTH); 8 Sep. 1997, *J. & F. Hort s.n.* (PERTH); 21 Sep. 2000, *F. Hort* 1158 (PERTH); 22 Sep. 2003, *F. Hort* 2005 (PERTH); 6 Sep. 2003, *F. Hort* 2029 (PERTH); 11 Aug. 1984, *G.J. Keighery* 7256 (PERTH); 2 Sep. 1997, *J.L. Robson s.n.* (PERTH 04958039); 2 Sep. 1997, *J.L. Robson s.n.* (PERTH 04958047); 26 July 1903, *O.H. Sargent* 17 (PERTH); 23 Sep. 2000, *H. Seeds* 152 (PERTH); 4 Sep. 1990, *L. Talbot s.n.* (PERTH).

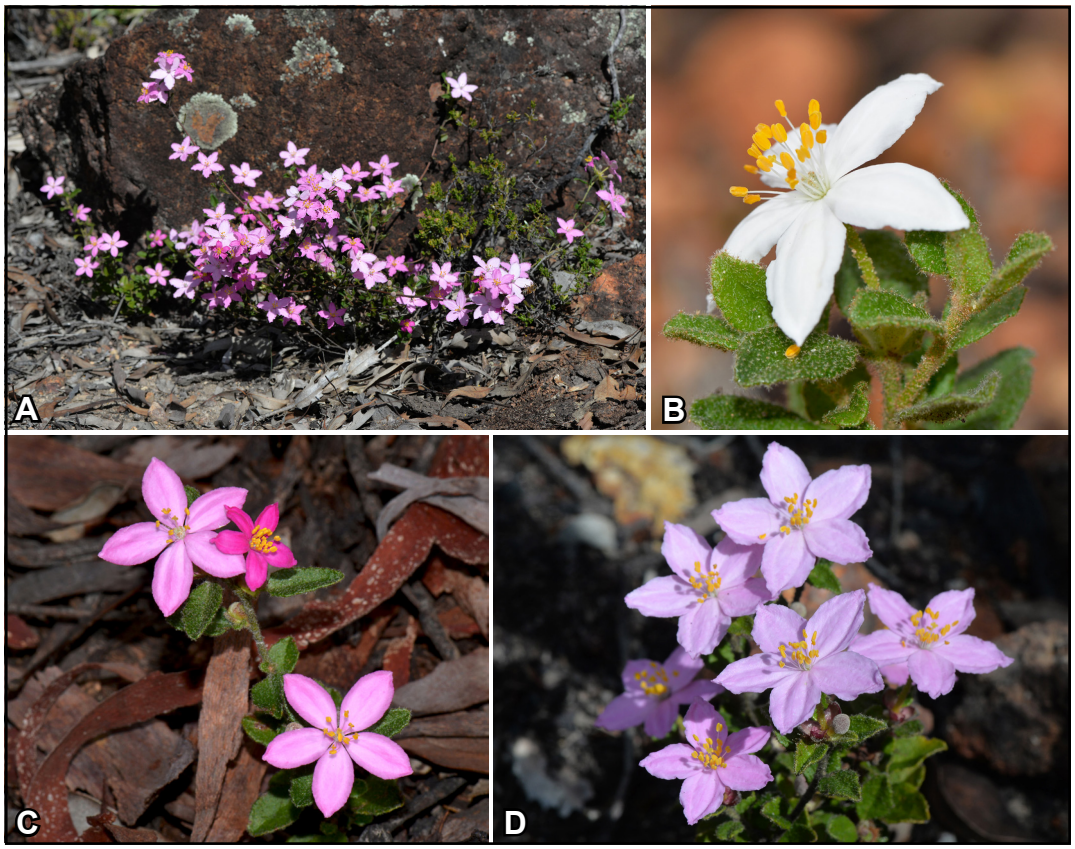

Figure 1. Petal colour and size variation within a single population of *Asterolasia grandiflora* from Wandoo National Park (*J. & F. Hort s.n.* PERTH 04958071). Images © Fred and Jean Hort.

Phenology. Flowers from July to October.

Distribution and habitat. *Asterolasia grandiflora* is confined to the northern portion of the Northern Jarrah Forest subregion and adjacent Avon Wheatbelt bioregion, occurring in the general vicinity of Bindoon, Toodyay and York (Figure 2). It grows in lateritic soils on hillslopes and breakaways, most commonly in *Eucalyptus accedens* or *E. wandoo* woodland.

Conservation status. *Asterolasia grandiflora* is currently listed as Priority Four under Department of Parks and Wildlife Conservation Codes for Western Australian Flora (Smith 2017). The inclusion of populations previously referred to *A. nivea* expands the known range of the species and increases the number of populations that occur in nature reserves; however, it is still geographically restricted and rare, with some populations appearing to be in decline (F. & J. Hort pers. comm.). As such, its conservation status is undergoing review (M. Smith pers. comm.).

***Asterolasia* sp. Kalgan River (S. Barrett 1522) = *A. hyalina* (Paul G.Wilson) Wege**

Asterolasia sp. Kalgan River is known from a single population on private property north-east of Albany. It was added to Western Australia's vascular plant census in 2006 and, following extensive regional surveys of potentially suitable habitat, was listed as Threatened with a status of Vulnerable (Smith 2017). This taxon was not discussed by Wilson (2013).

Examination of collections of *Asterolasia* at the Western Australian Herbarium has ascertained that *A.* sp. Kalgan River is morphologically comparable to *A. pallida* Benth. subsp. *hyalina* Paul G.Wilson, a conservation-listed taxon hitherto recorded from Dryandra State Forest, some 225 km to the north-north-west. Collections from both Albany and Dryandra have small leaves (3–7(–16) mm long), glabrous sepals, colourless stellate hairs with mostly appressed branches on the abaxial surface of the petals, and ten stamens. The material from the Albany population differs from the Dryandra population in having pale mauve-pink petals with a white centre (*cf.* pure white) and its leaves are more commonly deltate (i.e. with a truncate base) than ovate (*cf.* ovate). This variation is not considered herein to be taxonomically significant and *A.* sp. Kalgan River is synonymised below, with *A. pallida* subsp. *hyalina* treated as a distinct species (see notes provided below).

Asterolasia hyalina (Paul G.Wilson) Wege, *comb. et stat. nov.*

Asterolasia pallida Benth. subsp. *hyalina* Paul G.Wilson, *Nuytsia* 12(1): 84 (1998). *Type*: Dryandra [State Forest], Western Australia, 5 September 1992, *G.J. Keighery* 12276 (*holotype*: PERTH 03341410!).

Asterolasia sp. Kalgan River (S. Barrett 1522), Western Australian Herbarium, in *FloraBase*, https://florabase.dpaw.wa.gov.au/ [accessed 16 February 2017], *syn. nov.*

Erect or spreading and somewhat straggly *shrub* or *subshrub c.* 30–70 cm high. *Leaves* shortly petiolate, ovate to deltate (sometimes narrowly so), 3–7(–16) mm × (1.2–)2–4(–6.5) mm, sparsely to moderately stellate-hairy on both surfaces, becoming glabrous or somewhat scabridulous with age; margins sometimes recurved. *Umbels* terminal or axillary, sessile, (2–)3–8-flowered; pedicels 8–20 mm long, bearing rufous and colourless stellate hairs with branches radiating in all directions. *Sepals* broadly deltate, 0.2–0.3 mm long, glabrous. *Petals* elliptic to narrowly ovate, acute, 3–7 × 1.5–4.5 mm, white or mauve-pink grading white toward the centre, abaxial surface bearing colourless stellate hairs with mostly appressed branches. *Stamens* 10, glabrous; anthers 1–1.3 mm long, terminal gland not apparent. *Carpels* (1)2, stellate-hairy; style glabrous; stigma lobes fleshy, slightly recurved. *Cocci* with a beak *c.* 2.5–3.2 mm long.

Diagnostic features. *Asterolasia hyalina* can be differentiated from all other species in the genus by the following combination of characters: ovate to deltate leaves that are 3–7(–16) mm long; petals with colourless, appressed stellate hairs; and one or two carpels.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 30 Aug. 2006, *S. Barrett* 1522 (MEL, PERTH); 30 Oct. 2006, *J.A. Cochrane* JAC 6086 (PERTH); 5 Oct. 2002, *J. Foss & P. Gurry* 205 (PERTH); 5 Sep. 1992, *G.J. Keighery* 12284 (PERTH); 26 Aug. 1987, *D.M. Rose* 166 (PERTH).

Phenology. Flowers from August to September.

Distribution and habitat. *Asterolasia hyalina* is known from four populations, three of which occur in Dryandra State Forest at the boundary of the Avon Wheatbelt bioregion and Northern Jarrah Forest subregion; the fourth, southernmost population is from private property located north-east of Albany at the south-eastern end of the Southern Jarrah Forest subregion (Figure 2). The northernmost populations grow in sandy loam over granite or laterite on hillslopes or along creeklines in *Eucalyptus wandoo*, *E. accedens* or *E. astringens* woodland, sometimes in association with *Allocasuarina huegeliana*. The population near Albany grows in red clay loam over granite on a slope above the Kalgan River primarily

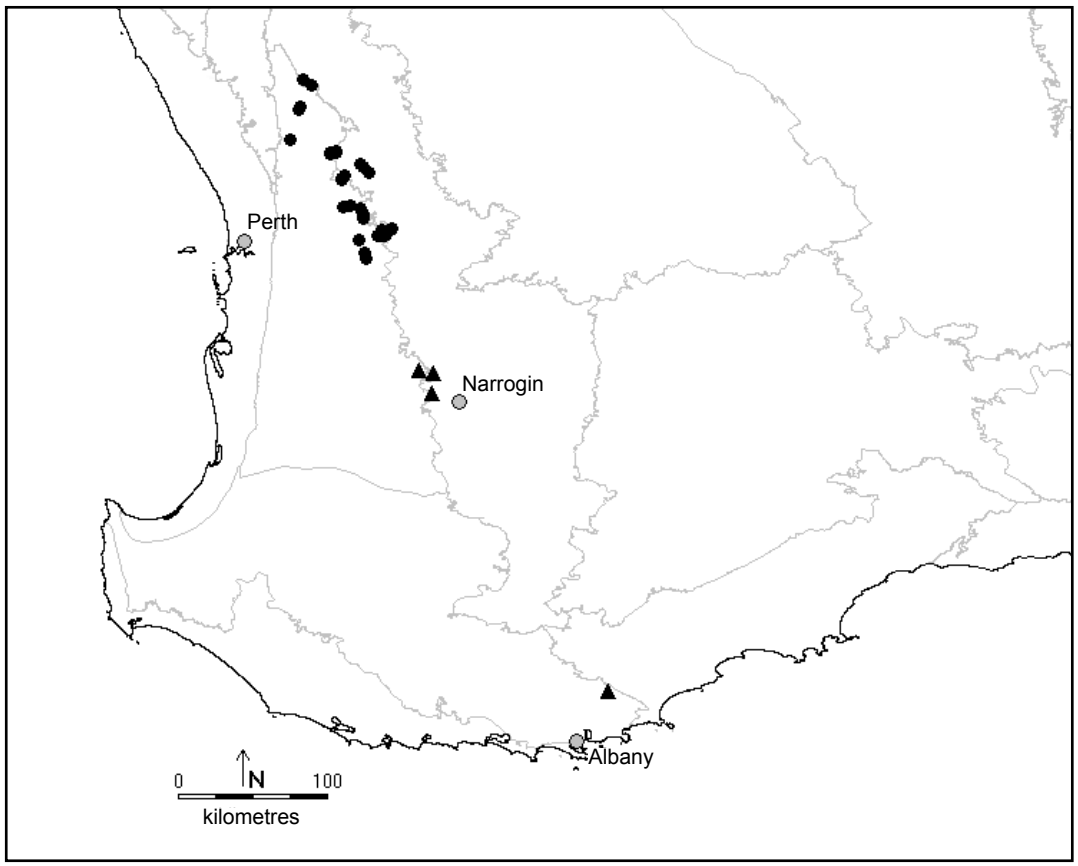

Figure 2. Distribution of *Asterolasia grandiflora* (●) and *A. hyalina* (▲) in Western Australia, with IBRA ver. 7 bioregions and subregions (Department of the Environment 2013) indicated in pale grey.

in scrub-heath with species including *Calothamnus quadrifidus*, *Hypocalymma angustifolia*, *Acacia sulcata* subsp. *sulcata*, *Hakea lissocarpha*, *Daviesia horrida*, *Leucopogon revolutus*, *Prostanthera canaliculata* and *Xanthorrhoea platyphylla*.

Conservation status. *Asterolasia hyalina* is listed as Priority Two under Department of Parks and Wildlife Conservation Codes for Western Australian Flora, under the name *A. pallida* subsp. *hyalina* (Smith 2017). While the inclusion of the population near Albany under this species greatly expands its extent of occurrence, it remains data deficient, with both population centres highly significant from a conservation perspective. The species is in need of further survey, including areas of suitable habitat between the two population centres, to ascertain whether a Threatened Flora listing is warranted.

Notes. *Asterolasia hyalina* is best regarded as a distinct species since it is quite dissimilar to *A. pallida*, a species with a reasonably widespread distribution in the Jarrah Forest bioregion. Differences between the two species include the size and shape of the leaves (ovate to deltate and 3–7(–16) mm long in *A. hyalina cf.* elliptic to broadly elliptic and (6–)10–30(–40) mm long in *A. pallida*), stamen number (10 in *A. hyalina cf.* 15–32), sepal surface (glabrous in *A. hyalina cf.* stellate-hairy), and colour and morphology of the stellate hairs on the petals (colourless with mostly appressed branches in *A. hyalina cf.* rufous and colourless with branches radiating in all directions). Wilson's (2013) description of *A. pallida*, which does not encompass the variation exhibited by *A. pallida* subsp. *hyalina*, remains

informative despite its change in circumscription, although the following modifications are proposed: *leaves* (6–)10–30(–40) mm long; *sepals* stellate-hairy; *stamens c.* 15–32. *Asterolasia dielsii* C.A.Gardner remains a synonym of *A. pallida*.

Asterolasia hyalina appears to be closely allied to *A. drummondii* Paul G.Wilson, a rare species with a distribution centred on the Lesueur Sandplain subregion. Both species have umbels with numerous flowers, petal hairs with appressed branches and ten stamens; however, unlike *A. hyalina*, *A. drummondii* has petals with mostly rufous-coloured stellate hairs, and elliptic to oblong (rarely ovate or lanceolate) leaves (6–)10–30 mm long.

Key to species of *Asterolasia* in Western Australia (adapted from Wilson 2013)

1. Petals yellow, with hairs of flat, fimbriate scales ..... **A. squamuligera**

1: Petals white, pink or mauve, with stellate hairs not as above

2. Petal hairs mostly yellow with prominently thickened centres and short, erect to somewhat spreading branches, forming an armour-like cover to the bud ..... **A. grandiflora**

2: Petal hairs not as above, with branches radiating in all directions or appressed

3. Petal hairs with branches radiating in all directions; stamens *c.* 15–32 ..... **A. pallida**

3: Petal hairs appressed; stamens 10

4. Petals hairs colourless; leaves ovate or deltate, 3–7(–16) mm long..... **A. hyalina**

4: Petals with both rufous and colourless hairs; leaves elliptic to oblong (rarely ovate or lanceolate), (6–)10–30 mm long..... **A. drummondii**

Acknowledgements

I thank Mike Hislop for his sage advice, Marco Duretto and Kelly Shepherd for helpful comments on the manuscript, and Fred and Jean Hort, Sarah Barrett, Ken Atkins, Melanie Smith and Ryonen Butcher for comments or discussions in the course of preparing this manuscript.

References

Department of the Environment (2013). *Australia's bioregions (IBRA)*, IBRA7, Commonwealth of Australia. http://www.environment.gov.au/land/nrs/science/ibra#ibra [accessed 15 February 2017].

Smith, M. (2017). *Threatened and Priority Flora list for Western Australia*. (Department of Parks and Wildlife: Kensington, Western Australia.)

Wilson, P.G. (1980). A new species of *Urocarpus* (Rutaceae) from Western Australia. *Nuytsia* 3(2): 211–213.

Wilson, P.G. (2013). *Asterolasia*. *In*: Wilson, A. (ed.) *Flora of Australia. Volume 26: Meliaceae, Rutaceae, Zygophyllaceae*. pp. 416–427. (Australian Biological Resources Study: Canberra.)