

Two new Western Australian species of *Dodonaea* (Sapindaceae) from northern Yilgarn ironstones

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Abstract

Shepherd, K.A., Rye, B.L., Meissner, R.A. & West, J.G. Two new Western Australian species of *Dodonaea* (Sapindaceae) from northern Yilgarn ironstones. *Nuytsia* 17: 375–384 (2007). *Dodonaea amplisemina* K.A.Sheph. & Rye and *D. scurra* K.A.Sheph. & R.A.Meissn. are two new species that occur on banded ironstone, greenstone or basalt hills in the Yilgarn region of Western Australia and are here described. Both species have conservation priority. A distribution map and photographs of the new species are presented along with amendments to the relevant part of the "Flora of Australia" key to species of *Dodonaea*.

Introduction

Dodonaea Miller (Sapindaceae) is a genus of at least 70 species, distributed in the tropics and extending into some temperate regions of the Southern Hemisphere. The last revision of Australian taxa by West (1984) recognised 61 Australian species, about half of which occur in Western Australia. West (1984: 127) noted the existence of unusual collections from near Cue and Paynes Find with small, flat leaves and large fruits with long appendages, which she regarded as a woody form of *D. pinifolia* Miq. Recent collections from several northern banded ironstone and greenstone ranges on the Yilgarn Craton have confirmed this variant as a distinct species. Consequently, in 2002 it was given the informal name *Dodonaea* sp. Ninghan (H. Demarz 5121) (Western Australian 1998–). A second new taxon occurring on banded ironstone was collected for the first time in 2000 in the Koolanooka Hills, east of Morawa. Distinguished by having multiple leaves clustered at each node and 3-locular, hairy fruits with long, horn-like appendages, this species was given the informal name *Dodonaea* sp. Koolanooka Hills (R. Meissner & Y. Caruso 17).

These two new species are among the many plant taxa unique to Western Australian banded ironstone and greenstone ranges. They are listed as having conservation priority and are named here to facilitate their conservation. They bring the number of species of *Dodonaea* recognised for Western Australia to 33. An amendment to a section of the key published previously for all Australian species of *Dodonaea* (West 1985) is given to accommodate both species.

Methods

This study is based on examination of herbarium specimens lodged at PERTH. Characters were scored from pressed specimens and from rehydrated material. Androecium and gynoecium measurements are based on a limited number of specimens, if recorded at all, due to a paucity of material. West (1984) noted that *Dodonaea* flowers are often inadequately represented on herbarium specimens. Furthermore, the taxonomic value of these characters is limited due to a lack of variation in size and structure within the genus. Multiple seed images were taken using a dissecting microscope mounted with a Nikon Digital Camera Head (DS-5M) controlled by a DS Camera Control Unit (DS-L1). A montage of the images was collated using Helicon Focus v 4.01 software. Precise localities are withheld for Declared Rare and Priority species due to conservation concerns. The distribution maps were created using ArcGIS 9.0 (ESRI) with coordinates from collections lodged at PERTH and include Version 6.1 Interim Biogeographic Regionalisation for Australia (IBRA) categories (Department of the Environment and Water Resources 2007).

Taxonomy

Dodonaea amplisemina K.A.Sheph. & Rye, sp. nov.

Dodonaea pinnifoliae Miq. affinis sed ramis divaricatae, seminis grandibus nitentibus differt.

Typus: Ninghan Station, Western Australia [precise locality withheld for conservation purposes], 6 October 1993, S.J. Patrick 1601 (*holo*: PERTH 05900271).

Dodonaea sp. Ninghan (H. Demarz 5121), Western Australian Herbarium, in FloraBase, <http://florabase.dec.wa.gov.au> [accessed May 2007].

Illustration. West (1984), Figure 78, p. 180 [upper illustration, as *D. pinifolia* J.G. West 3326].

Dioecious multi-stemmed shrubs 0.3–1 m high and 1–2 m wide, with scattered simple white hairs and flat glandular hairs on young stems and leaves, soon becoming glabrous. *Branchlets* woody, divaricate, sometimes spinescent, commonly with two distinct kinds of leaves within a cluster, some narrow and others broader, rarely with all leaves narrow. *Leaves* simple, sessile, apex obtuse to acute sometimes with a small apiculum to 0.2 mm long, margins flat or recurved to revolute, concolorous; narrow leaves linear or very narrowly obovate, 3.3–30(–50) mm long, 0.6–1.4 mm wide, margins entire, with scattered sessile tubercle-like glands and minute hairs on upper surface, eventually becoming glabrous but remaining tuberculate; broader leaves narrowly obovate or narrowly elliptic, 5.5–22 mm long, 1.9–3.1 mm wide, with minute simple or bifid hairs on upper surface and scattered sessile glands. *Flowers* solitary, pedicels 0.6–1.7 mm long. *Sepals* (in male flowers) 4–6, narrowly ovate to ovate, 1.8–2.7 mm long, 1.5–2 mm wide, apex acute, with scattered sessile glands on outer surface, densely ciliate on the margins with simple, crisped hairs up to 0.5 mm long and inner surface glabrous. *Stamens* 8, equal to or longer than the sepals; filaments 0.1–0.2 mm long; anthers 2.4–2.7 mm long, 0.3–0.4 mm wide, with a terminal appendage often curved inwards and 0.1–0.3 mm long. *Capsule* 3- or rarely 4-locular, globose or ovoid, (4.5)7–9.5 mm long, (5)7–12 mm wide excluding appendages (appendages triangular, 2–6 mm long, 1–3 mm wide), base and apex truncate, crustaceous, pinkish brown becoming dark brown at maturity, with sessile glands, dehiscence septifragal; style base absent. *Seeds* 3–6 per fruit, globose, 3.1–3.8 mm long, 2.7–3.3 mm wide, shiny, black; aril infundibular, 1.7–1.9 mm long, 1.2–3.0 mm wide from the side view, with a large dark pitted base, cream above. (Figure 1)



Figure 1. *Dodonaea amplisemina*. A – holotype (PERTH 5900271); B – fruit; C – dehisced fruit and seeds; D – seed of *D. amplisemina* (PERTH 05900271) (left) and *D. pinifolia* (PERTH 3116441) (right). Scale bars = 3 cm (A), 3 mm (B, C) and 2 mm (D).

Specimens examined. WESTERN AUSTRALIA: [localities withheld] 8 Sep. 1938, W.E. Blackall 3855 (PERTH 03103331); 22 Aug. 1974, H. Demarz 5121 (PERTH 03116093); 24 Aug. 2005, D.J. Edinger 5361 (PERTH 07247834); 13 July 1931, C.A. Gardner 2266 (PERTH 03116107); 13 July 1931, C.A. Gardner & W.E. Blackall 118 (PERTH 03116174); 27 Aug. 2005, A. Markey & S. Dillon 2933 (CANB, PERTH 07371136); 31 Aug. 2005, A. Markey & S. Dillon 2932 (PERTH 07371128); 1 Sep. 2005, A. Markey & S. Dillon 2934 (PERTH 07371144); 2 Sep. 2005, A. Markey & S. Dillon 2935 (PERTH 07371152); 1 Oct. 2006, A. Markey & S. Dillon 4121–4123 (PERTH 07506198; PERTH 07506201; PERTH 07506163); 3 Oct. 2006, A. Markey & S. Dillon 4118–4120 (MEL, NSW, PERTH 07506244; PERTH 07506236, PERTH 07506228); 4 Oct. 2006, A. Markey & S. Dillon 4124 (PERTH 07506171); 7 Aug. 2005, R. Meissner & Y. Caruso 43 (PERTH 07356463); 11 Aug. 2002, S.J. Patrick 4230 (BRI, MEL, NSW, PERTH 06370713); 30 Aug. 2003, S.J. Patrick 4714 & A. Crawford (PERTH 06690602); 13 Oct. 1993, A.L. Payne 30013 (PERTH 04429737); 9 Dec. 1978, J.G. West 3324–3327 (AD, CANB, PERTH).

03116468); 15 Oct. 1981, J.G. West 4494 (CANB 390323, PERTH 03358577); 16 Oct. 1981, J.G. West 4516–4517 (CANB 390342, CANB 390343); 30 July 1974, E. Wittwer 1250 (PERTH 03103463).

Distribution and habitat. Small, isolated populations of *Dodonaea amplisemina* occur on rocky hills from 140 km north-east of Meekatharra to 80 km south of Paynes Find. These populations occur in the Gascoyne (GAS), Murchison (MUR) and Yalgoo (YAL) regions of the Eremaean Botanical Province and in the Avon Wheatbelt (AW) of the South-West Botanical Province (Figure 2). The species most commonly grows in red-brown sandy clay soils on rocky basalt and gabbro or banded ironstone. A single population occurs on dolerite and quartzite hills (Figure 3).

Phenology. Flowers recorded in August. Fruits begin to mature from late August to October.

Conservation status. Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora: Priority Three. Although occurring over a distance of about 450 km, this species is known from few populations and appears to have a large disjunction in its range between the northern populations from Cue northwards and the southern populations clustered near Paynes Find. The intermediate area needs to be surveyed for further populations. Plants are frequently under heavy grazing pressure from livestock and feral goats. Although listed as Priority One under *D. sp. Ninghan* (H. Demarz 5121) by Atkins (2006), this status has been reassessed based on the current number of localities at which it is known.

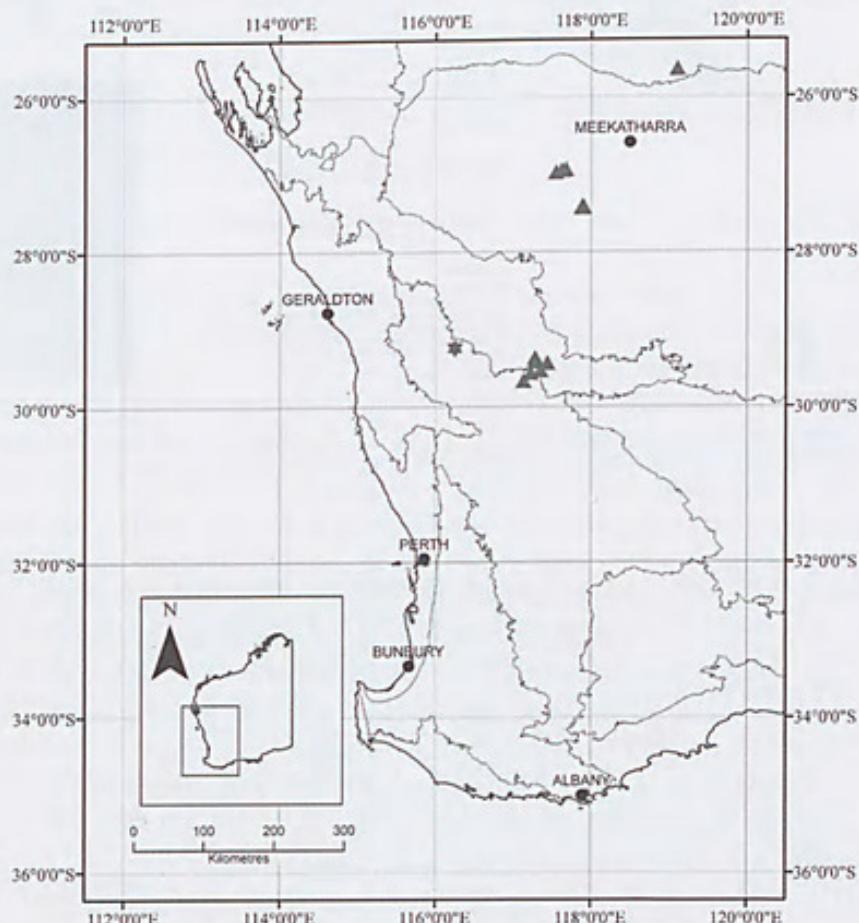


Figure 2. Distribution of *Dodonaea amplisemina* (▲) and *D. scurra* (★) in southern Western Australia, showing Version 6.1 IBRA regions.



Figure 3. *Dodonaea amplisemina* (J.G. West 3324–3327 CANB, PERTH) growing on quartzite hills near Cue. A – dome-shaped habit; B – fruits with three horn-like appendages. Note collections from this area have linear leaves only, rather than linear and narrowly obovate leaves but the seeds are typical of ironstone populations of *D. amplisemina*. Photographs: J.G. West.

Etymology. From the Latin *amplus* (large) and *semen* (seed), as this species can be distinguished from its closest relatives by its large, shiny seeds.

Affinities. *Dodonaea amplisemina* appears to be very closely related to the morphologically variable *D. pinifolia* in having similarly shaped fruits with horn-like appendages and small leaves. It is distinguished from that species by the presence of divaricate woody branches, (male) flowers with 4–6 acute sepals with villose hairs 0.5 mm long on the margin, almost sessile anthers and large, shiny, black seeds 3.1–3.8 mm long with the aril thickened at the base (Figure 1). In contrast, *D. pinifolia* (male) flowers have 4 acuminate sepals with hairs 0.1–0.2 mm long on the margin, filaments 0.7–1 mm long and dull black seeds 1.8–2.2 mm long. *Dodonaea amplisemina* also tends to have larger fruits and two distinct types of leaves. These leaves are not always clearly evident, however, as plants are often subject to heavy grazing. Specimens with immature fruits may be mistaken for *D. pinifolia*.

Dodonaea aptera Miq. has large, shiny, arillate seeds similar to *D. amplisemina* but this species is readily distinguished by its large ovate leaves. It is also confined to coastal limestone habitats along the west coast of Western Australia from Shark Bay to Augusta. Moreover, *D. aptera* does not appear to be placed close to *D. pinifolia* in phylogenetic analyses (M. Harrington, pers. comm.) and therefore is unlikely to be closely related to *D. amplisemina*.

Notes. *Dodonaea amplisemina* generally has both broad and narrow leaves clustered at a single node; however, collections from the population confined to the quartzite hills near an old mine site south of Cue have only small linear or very narrowly obovate leaves (West 1984: 180, Figure 78 – upper illustration as *D. pinifolia* J.G. West 3326; Figure 3). This is a disturbed site and notes from collections made in 1978 and 2002 indicate that the plants were severely drought-stressed with many plants dead and others with curled, yellow leaves. This population could represent a distinct variant confined to quartzite rather than banded ironstone, although the seeds are typical of *D. amplisemina*. Further collections are required to ascertain the status of this variant.

Dodonaea scurra K.A.Sheph. & R.A.Meissn., sp. nov.

Dodonaea caespitosae Diels affinis sed foliis 4–8(13) ad nodos confertis, capsula pilis albis simplicibus obtecta et 3 projecturis 3–6 mm longis praeditis differt.

Typus: Koolanooka Hills, Western Australia [precise locality withheld for conservation purposes], 12 October 2000, S. Hamilton-Brown s.n. (*holo*: PERTH 06476201; *iso*: CANB).

Dodonaea sp. Koolanooka Hills (R. Meissner & Y. Caruso 17), Western Australian Herbarium, in FloraBase, <http://florabase.dec.wa.gov.au> [accessed May 2007].

Dioecious, multi-stemmed shrubs 0.4–1 m high, with scattered simple white hairs on young stems and leaves, becoming glabrous with age. *Branchlets* erect and woody, with 4–8(13) leaves clustered at the nodes. *Leaves* simple, sessile, apex acute, with margins recurved to revolute, concolorous; linear to terete, rarely with 1–3 lobes, 2.0–12 mm long, 0.3–0.7 mm wide, with scattered erect white hairs 0.1 mm long. *Flowers* solitary in the axils, subsessile. *Sepals* (in male flowers) 4, narrowly obovate, 1.7–2.2 mm long, 0.4–0.6 mm wide, apex obtuse, glabrous or with scattered simple white hairs 0.1–0.2 mm long on outer surface, inner surface glabrous. *Stamens* 6, as long as or slightly longer than sepals; filaments 0.4–0.8 mm long; anthers 1.4–1.9 long, 0.6–0.7 mm wide. *Capsule* 3-locular, globose to transverse-elliptic in lateral view, (1.7)2.5–4 mm long, (1.3)3.0–6.6 mm wide excluding appendages (appendages elongated and narrowly triangular, 2.1–6.3 mm long, 0.8–1.7 mm wide), base and apex truncate, crustaceous, pinkish green becoming dark purple brown with age, hirsute, with simple white hairs 0.3–0.4 mm long, dehiscence septifragal; style base sometimes persistent. *Seeds* 3–6 per fruit, globose, 1.4–1.7 mm long, 1.2–1.7 mm wide, dull, black; aril infundibular, 0.8–1.7 mm long, 0.7–1.3 mm wide from the side view, white to cream. (Figures 4, 5)

Selected specimens. WESTERN AUSTRALIA: [localities withheld] 2 Aug. 2005, R. Meissner & Y. Caruso 16 (PERTH 07246145); 8 Oct. 2005, R. Meissner & Y. Caruso 11 (PERTH 07246102); 8 Oct. 2005, R. Meissner & Y. Caruso 12 (PERTH 07246137); 8 Oct. 2005, R. Meissner & Y. Caruso 15 (PERTH 07246064); 9 Oct. 2005, R. Meissner & Y. Caruso 8 (PERTH 07246129); 9 Oct. 2005, R. Meissner & Y. Caruso 9 (PERTH 07246072); 10 Oct. 2005, R. Meissner & Y. Caruso 10 (PERTH 07246110); 10 Oct. 2005, R. Meissner & Y. Caruso 13 (PERTH 07246099); 11 Oct. 2005, R. Meissner & Y. Caruso 17 (PERTH 07246056); 12 Oct. 2005, R. Meissner & Y. Caruso 14 (PERTH 07246080).

Distribution and habitat. This species is known only from the Koolanooka Hills, east of Morawa in the Avon Wheatbelt (AW) region of the South-West Botanical Province (Figure 2). It is confined to the upper slopes and crests of banded ironstone outcrops and occurs in fine to coarse gravel and brown sandy loam. It occurs in shrublands of *Eucalyptus ebbanoensis*, *Melaleuca* spp. and *Allocasuarina acutivalvis*.

Phenology. Flowers from August to October, with young fruits recorded in October.

Conservation status. DEC Conservation Codes for Western Australian Flora: Priority One, as this species is apparently geographically restricted to the Koolanooka Hills.

Etymology. Named from the Latin *scurrus* (jester), as the fruit capsule has three curved appendages at the apex, reminiscent of a court jester's cap.

Figure 4. Holotype of *Dodonaea scurra* (PERTH 06476201). Scale = 3 cm.



Figure 5. *Dodonaea scurra* (PERTH 06476201) fruit capsule showing the characteristic three, long, curved appendages for which this species is named. Scale = 3 mm.

Affinities. This species has a distinctive habit with long, spreading columnar branches. It is morphologically similar to *Dodonaea caespitosa* Diels, both species having linear to very narrowly obovate leaves that cluster at nodes, 6 stamens and up-curved horn-like appendages on the capsule. *Dodonaea scurra* is distinguished by having 4–8(13) leaves clustered at each node, distinctly rounded capsules with scattered simple white hairs (0.3–0.4 mm long) and appendages 2.1–6 mm long. *Dodonaea caespitosa* has only 3 or 4 leaves clustered at each node and a 3(4)-angled and glabrous capsule with appendages 1–3 mm long.

Notes. The description above is incomplete because female flowers are still unknown for this species; further collections are required.

Amendments to the Flora of Australia Key

The *Dodonaea* key in "Flora of Australia" (West 1985: 118) should be amended from couplet 34: as follows:

34: Capsule appendage up-curved and horn-like, rarely rounded and lobe-like
in *D. pinifolia*, 1–8 mm wide

34a Stamens 8; leaves 3–35(56) mm long, 1–13 mm wide

34b Branches divaricate; sepals 4–6, margins with villose hairs 0.5 mm long;
filaments 0.1–0.2 mm long; capsule (4.5)7–9.5 mm long excluding
appendages, appendages 2–6 mm long; seeds shiny, 3.1–3.8 mm long..... **D. amplisemina**

34b: Branches not divaricate; sepals 4, margins glabrous or with short hairs
0.1–0.2 mm long; filaments 0.5–1.0 mm long; capsule 3–7.5 mm long
excluding appendages, appendages 0.5–3.5 mm long; seeds dull, 1.4–2.2 mm long

- 44 Leaves flat, usually oblanceolate to obovate, rarely narrowly elliptic, 3–13 mm wide *D. ceratocarpa*
- 44: Leaves convex above, usually linear or filiform, rarely narrowly elliptic or obovate, 1–2(3) mm wide *D. pinifolia*
- 34a: Stamens 6; leaves 2–12 mm long, 0.3–3 mm wide
- 45 Leaves appearing clustered at nodes, obtuse and recurved, 2-grooved below, the margins revolute
- 46 Leaves 3 or 4 per cluster; capsule glabrous; capsule 2.5–3.5 mm long excluding appendages, appendages 0.5–3 mm long *D. caespitosa*
- 46: Leaves 4–8(13) per cluster; capsule hairy; capsule (1.7)2.5–4 mm long excluding appendages, appendages 2.1–6 mm long *D. scurra*
- 45: Leaves solitary at nodes, acute, not recurved, the margins revolute but not 2-grooved below *D. divaricata*

Acknowledgements

KS and RM were funded through the Western Australian Government's 'Saving our Species' biodiversity conservation initiative. Thanks to Sue Patrick who initially brought atypical specimens of *D. pinifolia* to the attention of BR, Adrienne Markey and Steve Dillon for collecting specimens and providing photographs of *D. amplisemina*, Paul Wilson for checking the Latin diagnoses, Alex Williams for training in the use of the camera system, Terry Macfarlane and Kevin Thiele for providing helpful comments on an earlier draft of this manuscript and all the curatorial staff at PERTH for their help.

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