Melaleuca dawsonii Craven

PUBLICATION: in Craven & Dawson, *Adansonia, sér. 3*, 20: 192 (1998)

DERIVATION: *dawsonii*, in honour of John Wyndham Dawson (1928–), of Wellington, New Zealand, who is an authority on the Myrtaceae of New Caledonia

SYNONYM: *Callistemon suberosum* Pancher ex Brongn. & Gris

DESCRIPTION: *Shrub* to 4 m tall. *Branchlets* hairy, the hairs dense and silvery grey and satiny. *Leaves* 60–85 mm long, 15–30 mm wide, subsessile; blade hairy, the hairs as on the branchlets, elliptic to obovate, the base attenuate, the apex rounded to retuse, the veins longitudinal, 5–15. *Inflorescences* subspheroidal, pseudoterminal. *Hypanthium* 3–4 mm long. *Calyx lobes* fimbriate, 2.3–2.8 mm long. *Petals* 2.8–5 mm long. *Stamens* 15–20 per flower, occasionally a few stamens may be fused at the base; filaments green, 25–35 mm long. *Style* 3–34 mm long. *Fruit* 4 mm long.

NATURAL OCCURRENCE: New Caledonia: the southern part of Grande Terre.

ECOLOGY: Recorded as occurring in more or less open maquis on more or less eroded or hard soils on ultramafic substrates.

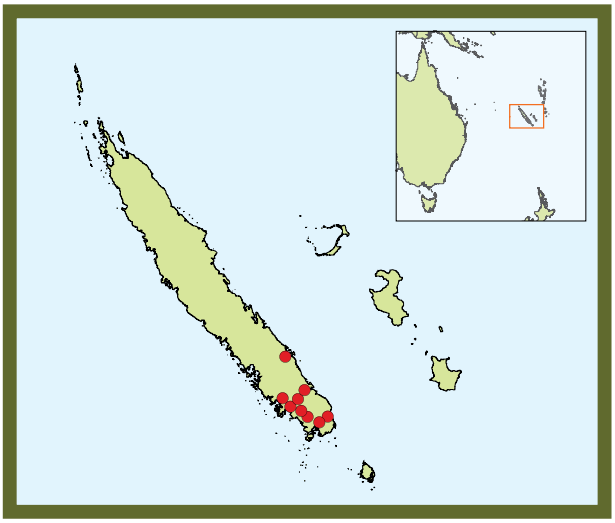
FLOWERING TIME: Recorded as flowering throughout the year but mainly from May to July.

ESSENTIAL OILS: The leaf oil of this species contained approximately equal amounts of mono- and sesquiterpenes. The principal monoterpenes encountered were α-pinene (12.8%), α-phellandrene (10.3%) and terpinolene (8.2%). There were lesser amounts of p-cymene (6.0%), α-terpineol (6.7%), E-β-ocimene (1.6%), limonene (1.8%) and linalool (1.2%). The principal sesquiterpenes in the oil were spathulenol (10.0%), globulol (8.0%), β-caryophyllene (4.9%), cubeban-11-ol (3.1%) and viridiflorol (2.1%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.1%.

REFERENCE ON ESSENTIAL OILS: Hnawia et al. 2012

NOTES: This is a very handsome species but its utilisation in horticulture is limited as it, as with the other endemic New Caledonian species, is difficult to grow on non-ultramafic soils.



Melaleuca dealbata S.T.Blake

PUBLICATION: *Contributions from the Queensland Herbarium* 1: 41, figs 5, 14E, 15E, 15N (1968)

DERIVATION: *dealbata*, from the Latin *dealbatus*, covered with a white powder, an apparent reference to the colour of the leaves that commonly give the crown of the plant a silvery, whitish appearance

DESCRIPTION: *Tree* 4–30 m tall; bark papery, white, cream or greyish. *Branchlets* glabrescent, pubescent with a lanuginulose understorey. *Leaves* alternate, 50–126 mm long, 10–30 mm wide, 2.3–8.5 times as long as wide, long-petiolate; blade glabrescent, lanuginulose with a pubescent overstorey, narrowly elliptic, elliptic, very narrowly elliptic or narrowly obovate, in transverse section transversely linear, the base attenuate, the apex acute, acuminate or narrowly acute, the veins longitudinal, 5–9, *oil glands* dense or moderately dense, distinct to obscure, scattered. *Inflorescences* spicate, interstitial or pseudoterminal, commonly lateral, with 7–28 triads, up to 25 mm wide. *Hypanthium* hairy, glabrescent or glabrous, 2–3 mm long. *Calyx lobes* abaxially hairy, 0.6–1.5 mm long, herbaceous to the margin or scarious in a broad marginal band up to 0.3 mm wide. *Petals* caducous or deciduous, 2.2–3.3 mm long. *Stamens* 5–8 per bundle; filaments white, cream, pale yellow or greenish, 5–7.5 mm long, the bundle claw 0.5–1.9 mm long, 0.2–0.4 times as long as the filaments. *Style* 7.8–11.9 mm long. *Ovules* c. 40–60 per locule. *Fruit* 2.5–3.6 mm long, the calyx lobes deciduous or weathering away; cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia, Northern Territory, Queensland; also Indonesia and Papua New Guinea: occurs disjunctly in the Broome–Derby and Weaber Range districts in Western Australia, the northern part of the Northern Territory, and from Cape York Peninsula south to the Bundaberg district in Queensland. The species also occurs in southern Papua province, Indonesia, and southern Papua New Guinea.

ECOLOGY: Recorded as occurring in tall mixed savannah woodland, open forest, in seasonally wet or perennial swamps, on sandy loam, clay, and humic soils.

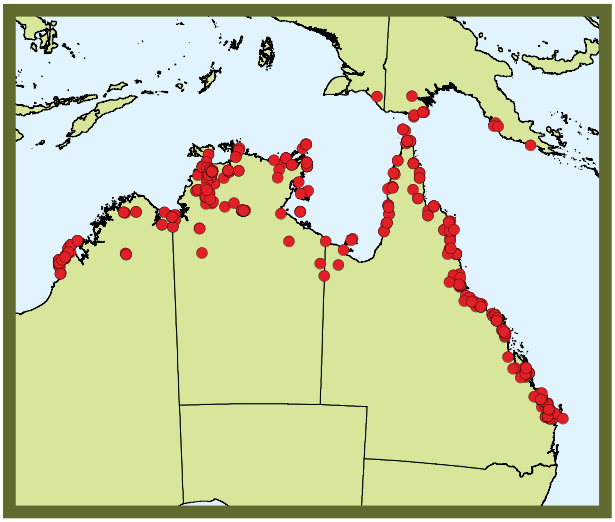
FLOWERING TIME: Recorded as flowering from May to December.

ESSENTIAL OILS: The leaf oil of this species was dominated by sesquiterpenes. The major compounds were β-caryophyllene (13–34%), caryophyllene oxide (6–19%), globulol (3–6%) and spathulenol (11–20%). There were many other sesquiterpenes present in small (<1%) amounts. Monoterpenes usually contributed virtually nothing to the oil, though in samples from Mt Molloy (JD 2070) α-pinene contributed 10–36%.

OIL YIELD: The oil yield (fresh weight, w/w) was 0.1–0.2%. The yield from the Mt Molloy samples was, likewise, poor (0.1–0.2%).

REFERENCES ON ESSENTIAL OILS: Brophy et al. 1988; Brophy and Doran 1996

NOTES: This species is perhaps less attractive than other tree species of the genus but it is well worth including in mixed plantings with greenish-leaved species in parks, roadside plantings etc. so that the distinctive silvery-greyish foliage of *M. dealbata* contrasts with the foliage of the other species.



Melaleuca deanei F.Muell.

PUBLICATION: *Proceedings of the Linnean Society of New South Wales*, *ser. 2*, 1: 1106 (1887)

DERIVATION: *deanei*, in honour of Henry Deane (1847–1924), a railways engineer who also made many contributions to Australian botany, especially in the fields of eucalyptology and palaeobotany and who collected the type material of this species

DESCRIPTION: *Shrub* 0.3–2.4 m tall; bark fibrous, grey. *Branchlets* rapidly glabrescent (the pubescent hairs, usually with some shorter lanuginose-pubescent and lanuginulose hairs also, ephemeral). *Leaves* alternate, 10–31 mm long, 3–9 mm wide, 3–6 times as long as wide, short- to long-petiolate; blade glabrescent, sericeous (sometimes grading to sericeous-pubescent), narrowly obovate to obovate or narrowly elliptic to elliptic, in transverse section transversely linear, the base cuneate or attenuate, the apex acuminate, the veins pinnate to longitudinal-pinnate, 5–9 when pinnate and 5–7 when longitudinal, *oil glands* dense, distinct, scattered. *Inflorescences* spicate, pseudoterminal, with 3–25 monads, up to 40 mm wide. *Hypanthium* hairy or rarely glabrescent, 3.5–5 mm long. *Calyx lobes* abaxially hairy or glabrescent, 1.3–2.2 mm long, usually herbaceous to the margin (sometimes an ill-defined band of thinner tissue to c. 0.4 mm wide is present around the margin). *Petals* deciduous, 4–6.5 mm long. *Stamens* 17–28 per bundle; filaments white, 8.5–18.5 mm long, the bundle claw 1.5–2.5 mm long, 0.1–0.2 times as long as the filaments. *Style* 11–19 mm long. *Ovules* c. 110–160 per locule. *Fruit* 7–9 mm long, the calyx lobes soon weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: New South Wales: from the Berowra district south to the Nowra district.

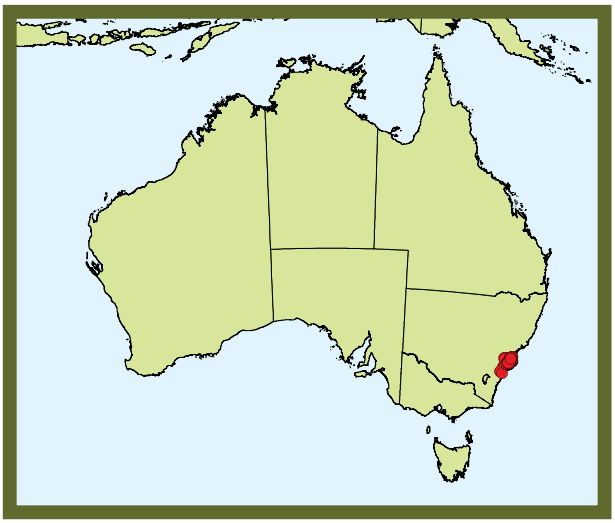
ECOLOGY: Recorded as occurring in dry sclerophyll forest, heathland, remnant swamp and woodland, on sandy loam, sandstone, and laterite.

FLOWERING TIME: Recorded as flowering from July to November.

ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The major components were α-pinene (46–52%) and 1,8-cineole (31–38%) These were accompanied by lesser amounts of limonene (2–3%) and α-terpineol (6–11%); no other component being greater than 0.5%. Sesquiterpenes were virtually absent from this oil, with the only significant members being E,E-farnesol, caryophyllene oxide and spathulenol (each 0.1%). The β-triketone leptospermone was also detected, though in trace amounts. A second sample (p147, Erich Lassak) produced a similar monoterpenic oil but contained slightly more leptospermone, as well as flavesone.

OIL YIELD: The oil yield (fresh weight, w/w) was 0.5–1.0%.

NOTES: This species is little known but has quite attractive flowers and should be trialled in dryish climates as an ornamental shrub.



Melaleuca ***decora*** (Salisb.) Britten

PUBLICATION: *The Journal of Botany, British and Foreign* 54: 62 (1916)

DERIVATION: *decora*, from the Latin *decorus*, becoming, fitting, beautiful, the reason for the choice of epithet not given but possibly in reference to the appearance of the specimens

SYNONYM: *Metrosideros decora* Salisb.

DESCRIPTION: *Tree* 8–10 m tall; bark papery, brown or greyish-white. *Branchlets* glabrescent, lanuginulose to lanuginulose-puberulous. *Leaves* alternate, 7.8–16.5 mm long, 1–2 mm wide, 4.5–10.5 times as long as wide, subsessile to short-petiolate; blade glabrescent, lanuginulose to lanuginulose-puberulous, very narrowly elliptic or narrowly elliptic, in transverse section sublunate or transversely linear, the base narrowly cuneate to attenuate, the apex narrowly acute to acute, the veins longitudinal, 3, *oil glands* dense, distinct to obscure, scattered. *Inflorescences* spicate, pseudoterminal or interstitial, with 3–30 monads or triads (at least the median floral units being triads), up to 17 mm wide. *Hypanthium* glabrescent or glabrous, 1.5–2.5 mm long. *Calyx lobes* abaxially glabrous, 0.7–1.1 mm long, herbaceous to the margin. *Petals* deciduous, 2.2–2.5 mm long. *Stamens* 20–40 per bundle; filaments cream or white, 5–8.6 mm long, the bundle claw 2.5–4.8 mm long, 0.4–0.6 times as long as the filaments. *Style* 6–7 mm long. *Ovules* 50–65 per locule. *Fruit* 2–3 mm long, the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Queensland, New South Wales: from the Burnett River district in Queensland south to the Shoalhaven River district in New South Wales, with a major gap occurring in northern New South Wales.

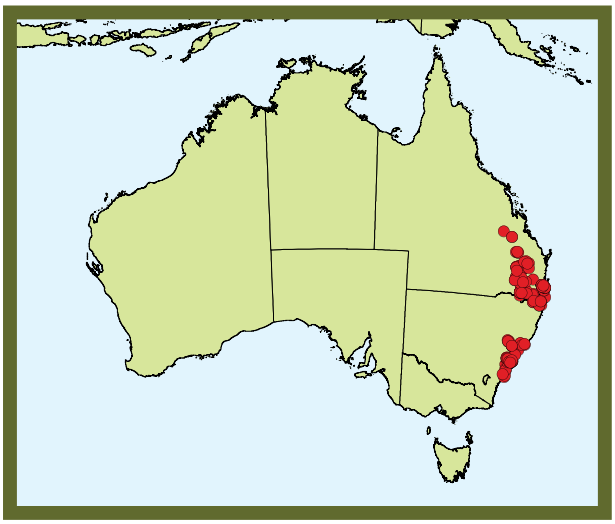
ECOLOGY: Recorded as occurring in open sclerophyll forest, mixed eucalypt forest, swamps, and on sand.

FLOWERING TIME: Recorded as flowering from November to January.

ESSENTIAL OILS: The leaf oil of this species contained both mono- and sesquiterpenes in similar amounts. There appeared to be two chemical forms present, depending on the amount of terpinen-4-ol present. The first chemical form contained α-pinene (18–30%), β-pinene (7–12%), terpinen-4-ol (1–2%), α-terpineol (2–3%), aromadendrene (5–9%), bicyclogermacrene (2–4%), globulol (4–8%), viridiflorol (2–5%) and spathulenol (1–3%). The second form contained α-pinene (21.8%), β-pinene (4.1%), terpinen-4-ol (15.8%), aromadendrene (10.3%), viridiflorene (6.9%), globulol (5.6%), viridiflorol (2.3%) and spathulenol (2.3%).

OIL YIELD: The oil yield in both cases (fresh weight, w/w) was 0.1–0.2%.

NOTES: This species is a useful ornamental shrub or small tree for subtropical or temperate regions and will tolerate damp soils. The amount of terpinen-4-ol present in one sample would indicate that a larger survey of the species may produce even better percentages of this compound, though the oil yield would have to be much improved.



Melaleuca decussata R.Br.

PUBLICATION: in Aiton, *Hortus Kewensis, ed. 2,* 4: 415 (1812)

DERIVATION: *decussata*, from the Latin *decussis*, the Roman numeral X (ten), hence *decussatus*, an allusion to the cross-shaped arrangement of the leaves when viewed down the axis of the branchlet

DESCRIPTION: *Shrub* 1–3 m tall. *Branchlets* glabrescent, puberulous to lanuginulose-puberulous. *Leaves* decussate, 4.5–15 mm long, 0.5–3 mm wide, 3–12 times as long as wide, subsessile; blade glabrescent, puberulous to lanuginulose-puberulous, very narrowly obovate, very narrowly elliptic, narrowly obovate or narrowly elliptic, in transverse section lunate, shallowly lunate, strongly lunate, subreniform or supervolute-curved, the base cuneate, the apex acute or obtuse, the veins longitudinal, 3, *oil glands* sparse to moderately dense, distinct to obscure, scattered to more or less in rows. *Inflorescences* spicate, interstitial or pseudoterminal, with 6–22 monads, up to 16 mm wide. *Hypanthium* glabrous or hairy, 1–1.7 mm long. *Calyx lobes* abaxially glabrous or rapidly glabrescent, 0.5–0.8 mm long, scarious in a marginal band 0.2–0.5 mm wide. *Petals* deciduous, 1.8–2.3 mm long. *Stamens* 12–26 per bundle; filaments mauve or purple, 4.5–6 mm long, the bundle claw 0.5–2 mm long. *Style* 6.5–7.5 mm long. *Ovules* c. 45–50 per locule. *Fruit* distinctly embedded in the rachis, the calyx lobes weathering away; cotyledons planoconvex.

NATURAL OCCURRENCE: South Australia, Victoria: from the Eyre Peninsula region of South Australia eastwards to central-eastern Victoria.

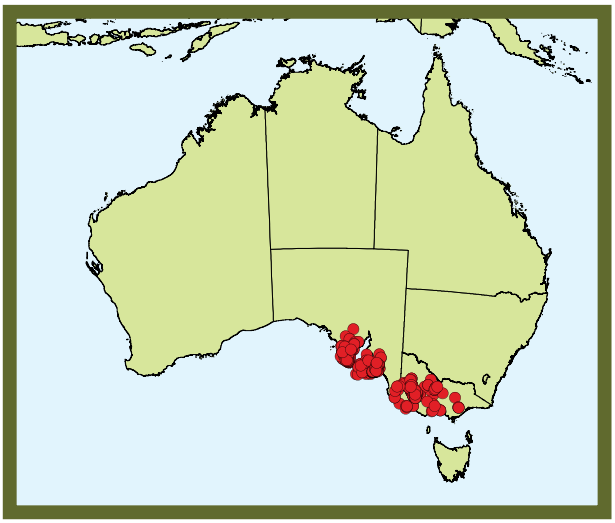
ECOLOGY: Recorded as occurring in heathland, coastal mallee, open eucalypt forest, open scrub, on alluvial sand/gravel, on limestone/laterite soils, clay loam, and quartzite.

FLOWERING TIME: Recorded as flowering from August to May.

ESSENTIAL OILS: The leaf oil from this species was monoterpenoid in nature. The principal components were 1,8-cineole (53–63%), limonene (7–16%), α-pinene (1–8%), terpinen-4-ol (1–2%) and α-terpineol (3–5%). Sesquiterpenes did not contribute much to the oil, with the principal components being aromadendrene (1–4%), β-caryophyllene (1–4%), viridiflorene (1–10%) and globulol (1–3%).

OIL YIELD: The oil yield (dry weight, w/w) was 0.4%.

NOTES: *Melaleuca decussata* is widely grown in temperate regions of Australia as it is hardy and adaptable to a range of soil types. The flowers unfortunately quickly fade (Wrigley and Fagg 1993) and this lessens the value of the species as an ornamental.

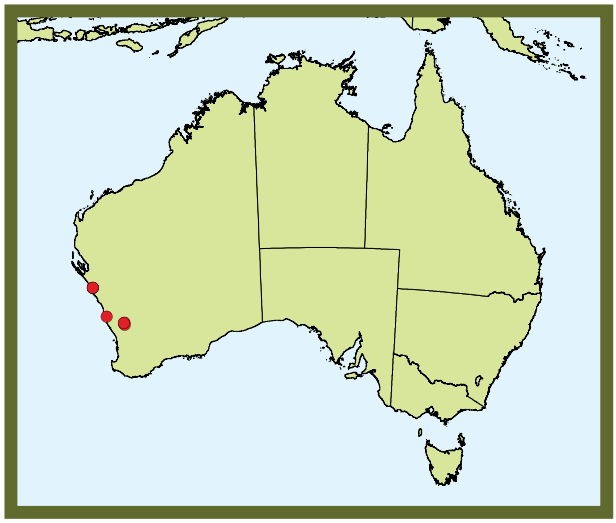


Melaleuca ***delta*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 872 (1999)

DERIVATION: *delta*, in honour of DELTA, a valuable computer software package for biological systematists and other scientists, especially those necessarily dealing with large datasets due to the complexities of the taxa concerned. The word DELTA is derived from DEscription Language for TAxonomy

DESCRIPTION: *Shrub*. *Branchlets* glabrescent, sericeous-pubescent or pubescent, occasionally puberulous or minutely sericeous. *Leaves* alternate, 5–12.5 mm long, 1.5–2.8 mm wide, 3.5–8 times as long as wide, sessile or subsessile; blade glabrescent, with cilia only or minutely sericeous to sericeous-lanuginulose, narrowly elliptic, very narrowly elliptic or narrowly ovate, in transverse section sublunate or transversely linear, the base cuneate or truncate, the apex acuminate or narrowly acute, the veins longitudinal, 7–9, *oil glands* moderately dense, distinct to obscure, more or less in rows. *Inflorescences* capitate, lateral, with 1–7 monads, up to 15 mm wide. *Hypanthium* glabrous, 1.8–2 mm long. *Calyx lobes* abaxially glabrous, weakly costate, 0.5–1 mm long, scarious in a marginal band 0.2–0.3 mm wide. *Petals* deciduous, 2–3 mm long. *Stamens* 15–40 per bundle; filaments white, 5–6 mm long, the bundle claw 3.5–4 mm long, 0.5–0.7 times as long as the filaments. *Style* 2–4(–7) mm long. *Ovules* 30–45 per locule. *Fruit* 3–4 mm long, with sepaline teeth (these may weather away); cotyledons planoconvex.



NATURAL OCCURRENCE: Western Australia: disjunct in the Kalbarri, Jurien and Wongan Hills districts.

ECOLOGY: Recorded as occurring in a *Melaleuca* swamp thicket, open heath, on saline silty soil, brown lateritic clay, laterite, and on gravelly loam on shallow sandstone.

FLOWERING TIME: Recorded as flowering in November and December.

ESSENTIAL OILS: This species produced a monoterpenoid oil. The principal component was 1,8-cineole (72.3%). This was accompanied by lesser amounts of α-pinene (11.0%), limonene (3.5%), myrcene (2.2%), β-pinene (1.3%), terpinen-4-ol (1.1%) and α-terpineol (0.6%). Sesquiterpenes contributed less than 5% of the oil, with the principal members being spathulenol (1.2%), globulol (0.8%), bicyclogermacrene (0.9%) and viridiflorol (0.6%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.8%.

Melaleuca dempta (Barlow) Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 872 (1999)

DERIVATION: *dempta*, from the Latin *demptus*, to take away, remove, in reference to the reduction of the sepaline teeth in this species

SYNONYM: *Melaleuca calycina* subsp. *dempta* Barlow

DESCRIPTION: *Shrub* 1.5–2.2 m tall. *Branchlets* soon glabrescent (the lanuginose-pubescent hairs ephemeral). *Leaves* decussate, 4.2–8 mm long, 2.5–6.2 mm wide, 1.1–1.9 times as long as wide, short-petiolate or subsessile; blade soon glabrescent (the lanuginose-pubescent hairs ephemeral), ovate, broadly ovate or elliptic, in transverse section lunate, the base rounded, cuneate or subcordate, the apex acute, broadly acute or obtuse, the veins longitudinal, 5–9, *oil glands* dense, obscure, scattered. *Inflorescences* capitate, pseudoterminal, with 1–4 monads, up to 18 mm wide. *Hypanthium* glabrous, c. 2.5 mm long. *Calyx lobes* abaxially glabrous, 1.3–2.6 mm long, scarious in a marginal band 0.1–0.2 mm wide. *Petals* deciduous, 2.6–2.9 mm long. *Stamens* 22–29 per bundle; filaments white or cream to yellow, 5.2–5.7 mm long, the bundle claw 1.7–2.3 mm long, 0.4–0.5 times as long as the filaments. *Style* c. 6.5 mm long. *Ovules* 35–45 per locule. *Fruit* 4.6–6.2 mm long, with sepaline teeth or (in young fruit) the calyx lobes persistent; cotyledons flattened planoconvex.

NATURAL OCCURRENCE: Western Australia: the Scaddan – Gibson – Dalyup River district.

ECOLOGY: Recorded as occurring in open eucalypt woodland with a dense shrub understorey, clay pans, near salt lakes, and on sandy soils.

FLOWERING TIME: Recorded as flowering in September and February.

ESSENTIAL OILS: The leaf oil of this species was predominantly monoterpenoid in character. The principal components were 1,8-cineole (7–38%), α-pinene (16–27%) and β-pinene (14–27%). These compounds were accompanied by lesser amounts of limonene (9–13%), E-β-ocimene (1–4%) and α-terpineol (2–3%). The principal sesquiterpenes were spathulenol (3–7%), globulol (1–3%) and aromadendrene (1–2%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.3–0.6%.

Melaleuca densa R.Br.

PUBLICATION: in Aiton, *Hortus Kewensis, ed. 2,* 4: 416 (1812)

DERIVATION: *densa*, from the Latin *densus*, dense, the reason for the choice of epithet was not given but this species possibly was so named because of the density of the leaves or of the flowers within the inflorescence

DESCRIPTION: *Shrub* 0.5–3 m tall; bark fibrous, grey or whitish. *Branchlets* hairy to glabrescent, lanuginose-pubescent or pubescent to puberulous. *Leaves* usually ternate or sometimes alternate, 2–9 mm long, 1–6.7 mm wide, 1–4.5 times as long as wide, subsessile or short-petiolate; blade glabrous to hairy (when present, the hairs lanuginose-pubescent or pubescent to puberulous), ovate, broadly ovate, elliptic, obovate, broadly obovate, rarely subcircular, narrowly ovate or oblong, in transverse section sublunate or transversely narrowly oblong, the base cuneate or rounded, the apex acute or broadly acute to obtusely shortly acuminate, the veins longitudinal, 3, *oil glands* moderately dense to sparse, distinct, more or less in rows. *Inflorescences* spicate or capitate, pseudoterminal, with 15–37 monads, up to 20 mm wide. *Hypanthium* hairy, 1.1–1.8 mm long. *Calyx lobes* abaxially glabrous, 0.6–0.8 mm long, herbaceous to the margin. *Petals* deciduous, 1.3–2 mm long. *Stamens* 3–6 per bundle; filaments yellow, cream, white or greenish, 4.8–6.5 mm long, the bundle claw 1.9–3.8 mm long, 0.2–0.6 times as long as the filaments. *Style* 5.5–5.9 mm long. *Ovules* 25–30 per locule. *Fruit* 1.8–2.6 mm long, with sepaline teeth or the calyx lobes weathering away; cotyledons planoconvex.

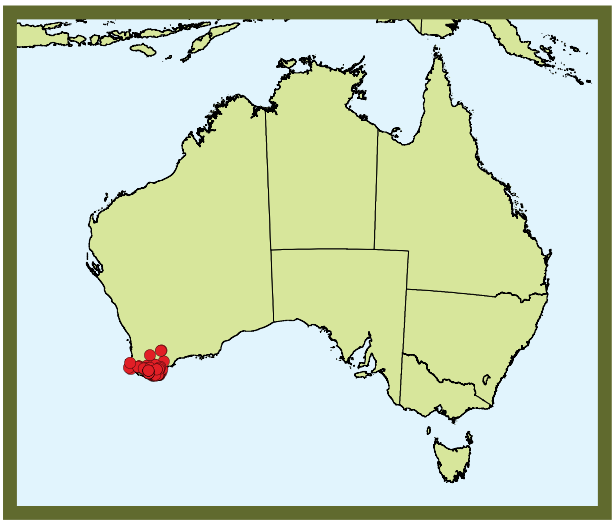
NATURAL OCCURRENCE: Western Australia: from the Augusta district eastwards to the Albany district and the Stirling Range.

ECOLOGY: Recorded as occurring in heathland, tall shrubland, eucalypt woodland, sand plain, on sandy loam, clay, and gravelly sand.

FLOWERING TIME: Recorded as flowering from August to December.

ESSENTIAL OILS: This species produced an oil in which 1,8-cineole was the principal component (42.3%). This was accompanied by lesser amounts of α-pinene (2.5%), limonene (2.0%) and α-terpineol (5.5%). The major sesquiterpenes identified were globulol (4.0%), spathulenol (6.2%), aromadendrene (2.2%), bicyclogermacrene (1.5%) and β-caryophyllene (1.2%).

OIL YIELD: The oil yield (dry weight, w/w) was 1.1%.

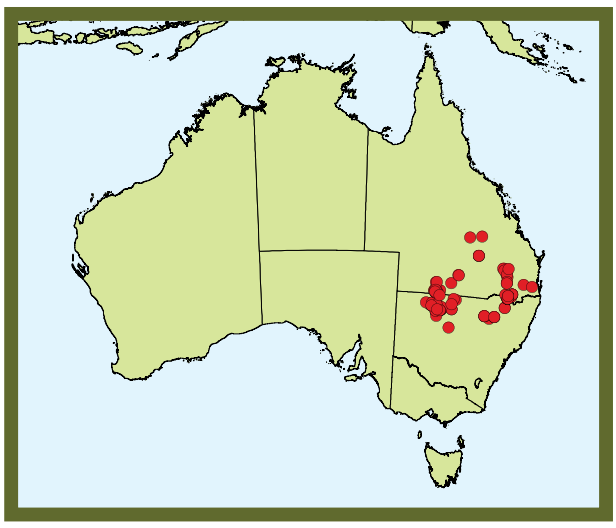


Melaleuca densispicata Byrnes

PUBLICATION: *Austrobaileya* 2: 74 (1984)

DERIVATION: *densispicata*, from the Latin *densus*, dense, and *spica*, spike, in reference to the flowers being close together in the inflorescence

DESCRIPTION: ***Shrub or tree*** 1.5–5 m tall; bark often papery, grey or whitish. ***Branchlets*** glabrescent, indumentum puberulous. ***Leaves*** decussate, 3–13.5 mm long, 0.6–1.2 mm wide, 6–12 times as long as wide, sessile; blade glabrous to glabrescent (when present, the hairs puberulous), linear-elliptic or very narrowly elliptic, in transverse section shallowly lunate, sublunate or transversely semi-elliptic, the base cuneate, the apex narrowly acute or acute, the veins longitudinal, 3–7, ***oil glands*** moderately dense, distinct to obscure, more or less in rows. ***Inflorescences*** spicate, pseudoterminal or lateral or rarely interstitial, with 5–24 monads, up to 20 mm wide. ***Hypanthium*** glabrous or hairy at the base, 0.9–1.2 mm long. ***Calyx lobes*** abaxially glabrous, costate, 1–1.3 mm long, herbaceous to the margin or scarious in a marginal band up to 0.1 mm wide. ***Petals*** caducous, c. 2.5 mm long. ***Stamens*** 8–15 per bundle; filaments white, 6.1–8.3 mm long, the bundle claw 2.8–4.9 mm long, 0.6 times as long as the filaments. ***Style*** 8.8–10 mm long. ***Ovules*** 20–25 per locule. ***Fruit*** 2.2–2.6 mm long, the calyx lobes at length deciduous; cotyledons planoconvex.



NATURAL OCCURRENCE: Queensland, New South Wales: widespread in southern Queensland and northern New South Wales.

ECOLOGY: Recorded as occurring in tall open shrubland, open forest, on eroded clay pan and margins of salt flats, and on sandy or clay soils.

FLOWERING TIME: Recorded as flowering from February to May and from September to December.

ESSENTIAL OILS: The oil obtained from this species contained large amounts of monoterpenes. The principal components were 1,8-cineole (61–70%), α-pinene (3–11%), β-pinene (3–9%), limonene (5%), α-terpineol (10–13%) and terpinen-4-ol (0.7–1.0%). Sesquiterpenes were neither numerous nor plentiful, with the principal components being spathulenol (0.6%) and caryophyllene oxide (0.1–0.2%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.8%.

Melaleuca ***depauperata*** Turcz.

PUBLICATION: *Bulletin de la classe physico-mathématique de l'Académie Impériale des Sciences de Saint-Pétersbourg* 10: 343 (1852)

DERIVATION: *depauperata*, from the Latin *depauperatus*, reduced, depauperate, possibly in reference to the type collection being few-flowered

DESCRIPTION: *Shrub* 0.3–2 m tall; bark fibrous. *Branchlets* soon glabrescent (the lanuginulose hairs ephemeral). *Leaves* alternate, 1.8–5 mm long, 1–1.8 mm wide, 2–3 times as long as wide, subsessile; blade soon glabrescent (the lanuginulose hairs ephemeral), obovate or narrowly elliptic, in transverse section transversely semielliptic or flattened transversely semielliptic, the base cuneate, rounded or truncate, the apex obtusely shortly acuminate or acute, the veins longitudinal, 3, *oil glands* moderately dense to dense (occasionally clustered), obscure, scattered. *Inflorescences* spicate, lateral, with (2–)4–17 monads, up to 15 mm wide. *Hypanthium* glabrous, 1.3–1.7 mm long. *Calyx lobes* abaxially glabrous, 0.4–0.8 mm long, scarious in a marginal band 0.1–0.2 mm wide. *Petals* deciduous, 2–2.5 mm long. *Stamens* 9–14 per bundle; filaments pale mauve, 3.8–7 mm long, the bundle claw 1.8–3 mm long, 0.5–0.6 times as long as the filaments. *Style* 5.5–6 mm long. *Ovules* 35–40 per locule. *Fruit* 3–4 mm long, with sepaline teeth; cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: from the Wagin district south to the Stirling Range and eastwards to the Muntadgin and Peak Charles districts.

ECOLOGY: Recorded as occurring in low shrubland, mallee woodland, open forest, on sandy clay, granite, sandy loam, and gravelly sand.

FLOWERING TIME: Recorded as flowering from September to January.

ESSENTIAL OILS: This species produced a monoterpenoid oil. There was a significant number of sesquiterpenes, but they did not contribute significantly to the oil. The principal monoterpenes were 1,8-cineole (47–60%) and α-pinene (19–25%). These were accompanied by lesser amounts of β-pinene (1–2%), limonene (5–6%), myrcene (1–2%) and α-terpineol (2–4%). The principal sesquiterpenes were α-, β- and γ-eudesmol (each 1–2% in one collection, but present at small levels in other collections), globulol (2–3%), spathulenol (0.5–0.7%) and aromadendrene (0.4–0.7%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.2–0.4%.

Melaleuca depressa Diels

PUBLICATION: in Diels & Pritzel, *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 35: 428 (1904)

DERIVATION: *depressa*, from the Latin *depressus*, flattened from above, somewhat sunken at the centre, but it is unclear as to which feature of the species this applies

DESCRIPTION: *Shrub* 0.3–2 m tall. *Branchlets* glabrescent, pubescent rarely to sericeous-pubescent. *Leaves* alternate, 6.4–12.5 mm long, 1.4–5.5 mm wide, 1.4–5 times as long as wide, subsessile to short-petiolate; blade glabrescent, pubescent to sericeous-pubescent and usually with some lanuginulose-puberulous hairs distally, elliptic to narrowly elliptic, narrowly obovate, very narrowly obovate or broadly elliptic, in transverse section transversely linear, the base cuneate to narrowly cuneate or rarely attenuate, the apex acute or obtusely shortly acuminate, the veins longitudinal (some poorly developed reticulate veins also present), 3–5, *oil glands* moderately dense, obscure to distinct, more or less in rows. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 2–6 triads, up to 20 mm wide. *Hypanthium* hairy, 1.5–2.5 mm long. *Calyx lobes* abaxially hairy, 0.6–2 mm long, scarious throughout or scarious in a marginal band 0.2–0.4 mm wide. *Petals* deciduous, 2.5–3 mm long. *Stamens* 9–13 per bundle; filaments yellow, yellowish-white, white or cream, 6.8–12.5 mm long, the bundle claw 2.2–5.5 mm long, 0.3–0.6 times as long as the filaments. *Style* 10–13 mm long. *Ovules* (5–)15–20 per locule. *Infructescences* peg-fruited (occasionally subglobose). *Fruit* 3–4.5 mm long, the calyx lobes weathering away or the fruit with sepaline teeth formed from the basal half of the calyx lobes; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Geraldton–Northampton district.

ECOLOGY: Recorded as occurring in heathland, low open shrubland, sand plain, on sandy loam, laterite ridge, and sand.

FLOWERING TIME: Recorded as flowering from July to November.

ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal monoterpenes were linalool (37.3%) and α-pinene (17.6%). These were accompanied by lesser amounts of β-pinene (5.4%), 1,8-cineole (9.0%) and α-terpineol (1.8%). The major sesquiterpenes encountered were globulol (1.8%), viridiflorol (1.6%), spathulenol (2.4%) and α-, β- and γ-eudesmol (2.6%, 5.6% and 4.3%, respectively).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.3%.

Melaleuca dichroma Craven & Lepschi

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 14: 971 (2001)

DERIVATION: *dichroma*, from the Greek *di-*, two, double and *chroma*, colour, in reference to the staminal filaments changing in colour from cream to whitish at anthesis to pinkish as the flower ages

SYNONYMS: *Melaleuca urceolaris* var. *virgata* Benth.; *Melaleuca virgata* (Benth.) Craven

DESCRIPTION: *Shrub* 0.3–1 m tall. *Branchlets* glabrescent, pubescent to lanuginulose-puberulous or rarely lanuginose-pubescent or lanuginulose (hairs are often appressed but are too coarse to be sericeous), the hairs somewhat matted. *Leaves* alternate, 3.7–15.5 mm long, 0.5–1.3 mm wide, 6–14 times as long as wide, subsessile; blade glabrescent, more or less matted pubescent to lanuginulose-puberulous or lanuginose-pubescent (rarely some lanuginulose hairs may also be present) and usually with long spreading pubescent hairs on the adaxial surface, linear-obovate or linear, in transverse section transversely elliptic to subcircular, the base parallel (blade width equals petiole width), the apex acute to obtuse or obtusely shortly acuminate, the veins longitudinal, 3, *oil glands* moderately dense, distinct, more or less in rows. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 1–4 triads, up to 15 mm wide. *Hypanthium* hairy, 1.2–1.7 mm long. *Calyx lobes* abaxially glabrous or glabrescent, 0.7–1.1 mm long, scarious throughout. *Petals* caducous, 1.4–3 mm long. *Stamens* (3–)6–13 per bundle; filaments yellow, white, creamy-white, apparently ageing to red or pinkish, 4.1–8.7 mm long, the bundle claw (0.8–)1.4–3.7 mm long, 0.2–0.5 times as long as the filaments. *Style* 7.5–10.5 mm long. *Ovules* 15–20 per locule. *Infructescences* peg-fruited. *Fruit* 3–5 mm long, the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Arrino – Hill River – Moora district.

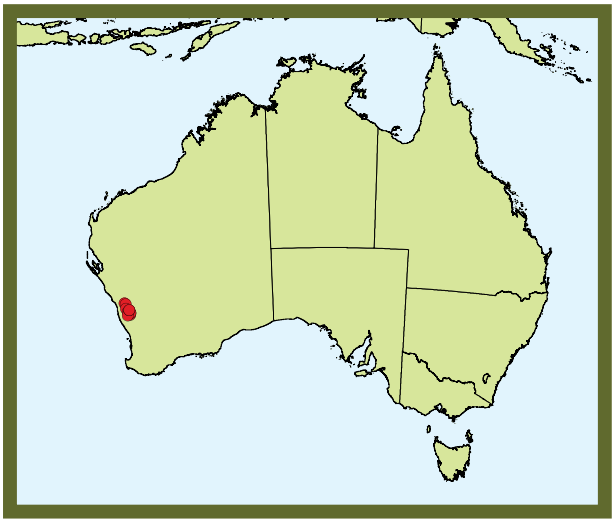
ECOLOGY: Recorded as occurring in sand plain, heathland, low scrub, on loamy sand, lateritic gravel with sand, sand, and sandy gravelly loam.

FLOWERING TIME: Recorded as flowering from August to November.

ESSENTIAL OILS: The oil of this species was dominated by monoterpenes. The principal component was 1,8-cineole (55.2%). This was accompanied by lesser amounts of α-pinene (2.4%), β-pinene (5.3%), limonene (4.0%) and α-terpineol (1.2%). Sesquiterpenes did not contribute much to the oil, with the principal members being globulol (4.0%), viridiflorol (2.3%) and spathulenol (5.0%).

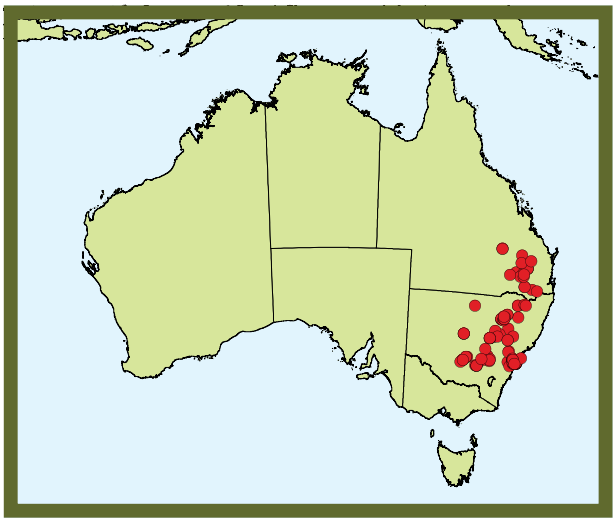
OIL YIELD: The oil yield (fresh weight, w/w) was 0.1%.

NOTES: The change in colour as the flowers age is a feature that makes this species, together with the related *M. urceolaris*, worth experimenting with as an ornamental subject. Both these species are from regions with a Mediterranean climate. Interestingly, the unrelated *M. gnidioides* from New Caledonia similarly has flowers that change colour. This feature may be a signal to pollinators that a reward is no longer available, the colour change perhaps occurring after fertilisation of the ovules.



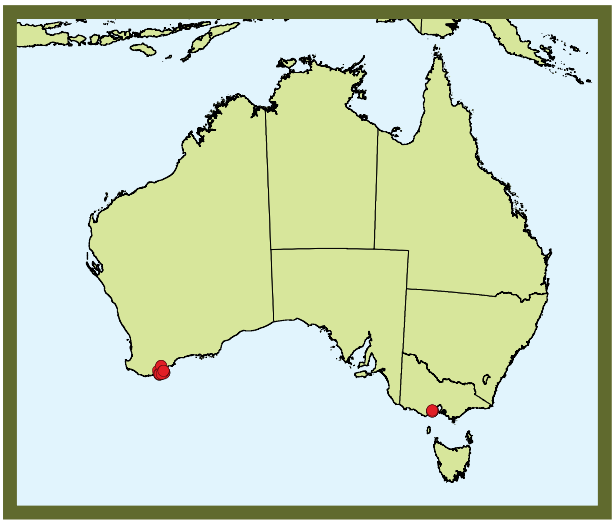
Melaleuca diosmatifolia Dum.-Cours.

PUBLICATION: *Le Botaniste Cultivateur, ed. 2,* 5: 373 (1811)
DERIVATION: *diosmatifolia*, from *Diosma*, a genus of Rutaceae, and the Latin *folium*, leaf, in reference to a perceived similarity between the leaves of this species to those of *Diosma*
DESCRIPTION: *Shrub* 0.5–2 m tall; bark grey. *Branchlets* soon glabrescent (the lanuginulose hairs ephemeral). *Leaves* alternate, 3.5–14.5 mm long, 0.4–0.9 mm wide, 9–35 times as long as wide, subsessile; blade soon glabrescent (the lanuginulose hairs ephemeral), linear or linear-obovate, in transverse section transversely elliptic or flattened transversely semielliptic, the base attenuate, the apex acuminate, obtusely shortly acuminate or acute, 1-veined, *oil glands* sparse, distinct, more or less in rows. *Inflorescences* spicate, interstitial or pseudoterminal, with 15–50 monads, up to 18 mm wide. *Hypanthium* glabrescent to subglabrous, 1–2 mm long. *Calyx lobes* abaxially glabrous, 0.5–0.8 mm long, scarious in a marginal band 0.1–0.2 mm wide. *Petals* deciduous, 1.8–2.8 mm long. *Stamens* usually in 5 bundles or occasionally in 6, 15–26 per bundle when in 5 bundles; filaments mauve, purple, pink or white, 6–9.5 mm long, the bundle claw 4–5.5 mm long, 0.6 times as long as the filaments. *Style* 7–9.5 mm long. *Ovules* c. 80–90 per locule. *Fruit* 2–3 mm long, with sepaline teeth; cotyledons planoconvex to flattened planoconvex.
NATURAL OCCURRENCE: New South Wales, Queensland: from the Chinchilla district in Queensland south and west to the Sydney and Temora districts in New South Wales.
ECOLOGY: Recorded as occurring in woodland, swampy scrub, dry sclerophyll forest, dry watercourses, heath, on sandy clay, sandstone, and gravelly loam.
FLOWERING TIME: Recorded as flowering from November to May.
ESSENTIAL OILS: The oil from this species was dominated by monoterpenes. The principal components were 1,8-cineole (70–73%), α-pinene (3–5%), limonene (8–9%), terpinen-4-ol (0.4–0.8%) and α-terpineol (6–10%). Sesquiterpenes did not contribute much to the oil, with the main components being globulol (0.3–0.6%), spathulenol (0.2–0.3%), β-caryophyllene (0.1–0.5%) and aromadendrene (0.1–0.4%).
OIL YIELD: The oil yield (fresh weight, w/w) was 0.7–1.4%.
NOTES: This is a hardy species that is successful in subtropical and temperate regions. Wrigley and Fagg (1993) reported that the flowers do not fade quickly and thus this species might be a good replacement for *M. decussata*.



Melaleuca diosmifolia Andrews

PUBLICATION: *The Botanists' repository* 7: t. 476 (1807)
DERIVATION: *diosmifolia*, from *Diosma*, a genus of Rutaceae, and the Latin *folium*, leaf, in reference to a perceived similarity between the leaves of this species to those of *Diosma*
DESCRIPTION: *Shrub* 1.5–3 m tall. *Branchlets* glabrescent or sparsely puberulous. *Leaves* alternate, 4–13 mm long, 3–5 mm wide, 1.3–3.2 times as long as wide, short-petiolate; blade glabrescent or sparsely puberulous, narrowly elliptic, narrowly ovate, elliptic or ovate, in transverse section transversely linear, the base cuneate or rounded, the apex acute, the veins longitudinal, 3–5, *oil glands* moderately dense, obscure, more or less in rows. *Inflorescences* spicate, pseudoterminal or interstitial, with 25–30 monads, up to 50 mm wide. *Hypanthium* glabrous, 3–4 mm long. *Calyx lobes* abaxially glabrous, 1–2 mm long, scarious in a marginal band 0.1–0.3 mm wide. *Petals* deciduous, 3.5–4.8 mm long. *Stamens* 3–5 per bundle; filaments green, 13–20 mm long, the bundle claw 2.8–4.5 mm long, 0.1–0.2 times as long as the filaments. *Style* 2–2.5 mm long. *Ovules* c. 130–180 per locule. *Fruit* 5–8 mm long, with sepaline teeth; cotyledons obvolute.
NATURAL OCCURRENCE: Western Australia, Victoria: the Albany district of Western Australia, and naturalised in the Otways district of Victoria.
ECOLOGY: Recorded as occurring in open coastal heath, eucalypt woodland, on sand over granite, and clay.
FLOWERING TIME: Recorded as flowering from September to November.
ESSENTIAL OILS: This species presented a predominantly monoterpenoid oil. The principal component was 1,8-cineole (62.8%). This was accompanied by lesser amounts of α-pinene (9.6%), limonene (7.5%), myrcene (2.3%) and α-terpineol (1.6%). Sesquiterpenes did not contribute much to the oil, with the principal contributors being γ-, α- and β-eudesmol (1.8%, 3% and 3.4%, respectively) and globulol (1.3%).
OIL YIELD: The oil yield (fresh weight, w/w) was 1.2%.
NOTES: The green flowers are relatively unusual as far as ornamental shrubs are concerned and this species is commonly cultivated in temperate regions of Australia.



Melaleuca dissitiflora F.Muell.

PUBLICATION: *Fragmenta phytographiae Australiae* 3: 153 (1863)

DERIVATION: *dissitiflora*, from the Latin *dissitus*, apart, remote, and *flos*, flower, in reference to the flowers not being closely clustered within the inflorescence

DESCRIPTION: *Shrub or tree* 1–5 m tall; bark rough, becoming papery, grey. *Branchlets* rapidly glabrescent (the lanuginulose and sericeous-lanuginulose hairs ephemeral). *Leaves* alternate, 13–50 mm long, 1–5.5 mm wide, 7–40 times as long as wide, short-petiolate; blade rapidly glabrescent (the lanuginulose and sericeous-lanuginulose hairs ephemeral), very narrowly obovate, very narrowly elliptic, linear-obovate or linear-elliptic, in transverse section suboblong, sublunate, flattened transversely semi-elliptic or subcircular, the base narrowly cuneate, the apex narrowly acuminate or narrowly acute, the veins longitudinal, 3, *oil glands* dense to moderately dense, obscure to distinct, scattered. *Inflorescences* spicate, pseudoterminal or interstitial, with 10–30 monads, up to 12 mm wide. *Hypanthium* hairy (often sparsely so), 1.3–2 mm long. *Calyx lobes* abaxially glabrous or rarely hairy, 0.8–1.3 mm long, scarious in a marginal band 0.1–0.2 mm wide. *Petals* deciduous, 1.5–2 mm long. *Stamens* 15–35 per bundle; filaments white to cream, 4–9.5 mm long, the bundle claw 2–4.5 mm long, 0.5–0.6 times as long as the filaments. *Style* 4–6.5 mm long. *Ovules* 40–50 per locule. *Fruit* 2.2–3.5 mm long, the calyx lobes persistent (often becoming slightly woody and eventually weathering with the basal portion sometimes remaining as a small undulation on the hypanthium rim); cotyledons subobvolute (almost planoconvex).

NATURAL OCCURRENCE: Western Australia, Northern Territory, South Australia, Queensland: occurs disjunctly in the Rawlinson Range district in Western Australia, the Northern Territory, western Queensland, and north-western and eastern South Australia.

ECOLOGY: Recorded as occurring in stony creek beds, rocky gullies, gorges, dry watercourses, in sand, and alluvial soil.

FLOWERING TIME: Recorded as flowering in May and from August to November.

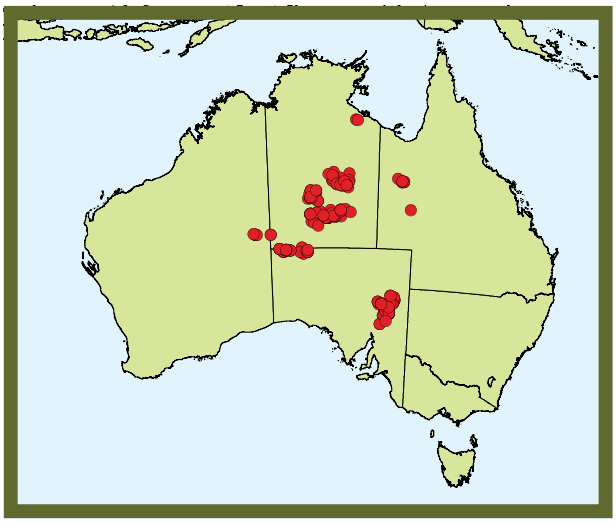
ESSENTIAL OILS: This species occurred in two chemotypes, both of which were monoterpenic. Chemotype I contained a major amount of 1,8-cineole (64%) and lesser amounts of limonene (6%), γ-terpinene (3%), terpinolene (3%) and α-terpineol (7%). Chemotype II contained major amounts of terpinen-4-ol (38%) and γ-terpinene (15%), with lesser amounts of β-pinene (8%), sabinene (8%), α-terpinene (7%), limonene (5%) and p-cymene (8%).

OIL YIELD: The oil yield (fresh weight, w/w) was 1.6–3.3%.

REFERENCES ON ESSENTIAL OILS: Brophy and Lassak 1983; Brophy and Doran 1996; Brophy 1999

NOTES: When the fruit are mature, the hypanthium wall splits, apparently to facilitate shedding of the seed. This also occurs in the related *M. linophylla*.

Melaleuca dissitiflora is being trialled in central New South Wales, as its terpinen-4-ol chemotype may be worthwhile cultivating in plantations in dry regions as a source of tea tree oil. As with the related *M. linariifolia*, the flowers are very showy and the species has potential as an ornamental shrub in arid to semi-arid regions.



Melaleuca eleuterostachya F.Muell.

PUBLICATION: *Fragmenta phytographiae Australiae* 3: 117 (1862)

DERIVATION: *eleuterostachya*, from the Greek *eleutheros*, free, and *stachys*, spike, an apparent reference to the inflorescences seemingly erupting from the branchlets below the foliage

DESCRIPTION: *Shrub or tree* 1–6 m tall; bark fibrous or papery. *Branchlets* often soon glabrescent (the sericeous-lanuginulose, sericeous-pubescent or pubescent hairs ephemeral). *Leaves* decussate, 2.7–14 mm long, 0.8–1.8 mm wide, 2.5–9.5 times as long as wide, sessile; blade often soon glabrescent (the lanuginulose or sericeous-lanuginulose hairs ephemeral), narrowly elliptic, very narrowly elliptic to linear-elliptic, narrowly obovate or narrowly oblong, in transverse section flattened transversely semielliptic, semicircular, depressed obovate or shallowly lunate (rarely depressed obovate with shallow concavity on adaxial surface), the base cuneate or truncate, the apex acuminate, acute or narrowly acute, the veins longitudinal, 5–7, *oil glands* moderately dense, distinct to obscure, more or less in rows. *Inflorescences* capitate to spicate, lateral, with 8–20 triads, up to 20 mm wide. *Hypanthium* glabrous or obscurely hairy, 1–1.8 mm long. *Calyx lobes* abaxially glabrous, costate, 0.8–1 mm long, scarious in a marginal band 0.1–0.2 mm wide. *Petals* caducous, 1.8–2.4 mm long. *Stamens* 12–18 per bundle; filaments cream or white, 8–9.5 mm long, the bundle claw 2.5–4 mm long, 0.5–0.7 times as long as the filaments. *Style* 7.5–8.5 mm long. *Ovules* 20–35 per locule. *Fruit* 2.5–4 mm long, with sepaline teeth; cotyledons subobvolute (almost planoconvex).

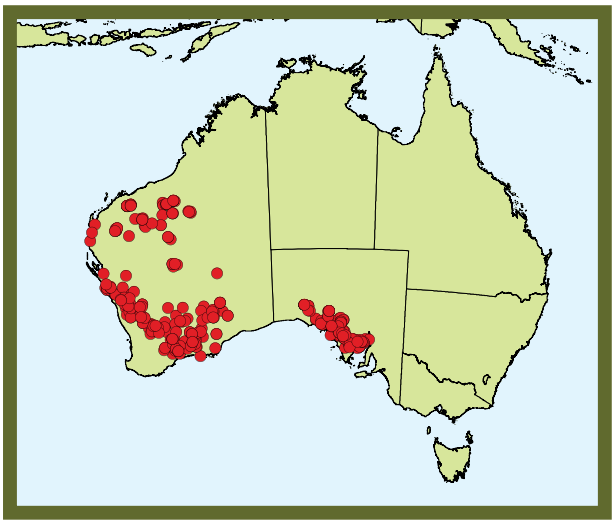
NATURAL OCCURRENCE: Western Australia, South Australia: central and southern Western Australia, and central-southern South Australia.

ECOLOGY: Recorded as occurring in heathland, mallee spinifex, mallee heath, open shrubland, *Melaleuca* shrubland with mallees, on sand dune swales and crests, edge of dry salt lake, sand over limestone, laterite, quartzite, clayey waterlogged soil, calcareous soil, and at the base of granite outcrops.

FLOWERING TIME: Recorded as flowering from January to December.

ESSENTIAL OILS: The leaf oil of this species contained significant amounts of both mono- and sesquiterpenes. The principal monoterpenes were 1,8-cineole (19–26%) and β-pinene (10–15%). These were accompanied by lesser amounts of α-pinene (3–5%), limonene (5–8%), terpinen-4-ol (0.7–2.0%) and α-terpineol (5–6%). The principal sesquiterpenes were γ-eudesmol (4–7%), α-eudesmol (1–3%), β-eudesmol (3–8%), globulol (2–4%), viridiflorol (1–2%) and spathulenol (4–7%).

OIL YIELD: The oil yield (fresh weight, w/w) was <0.1%.

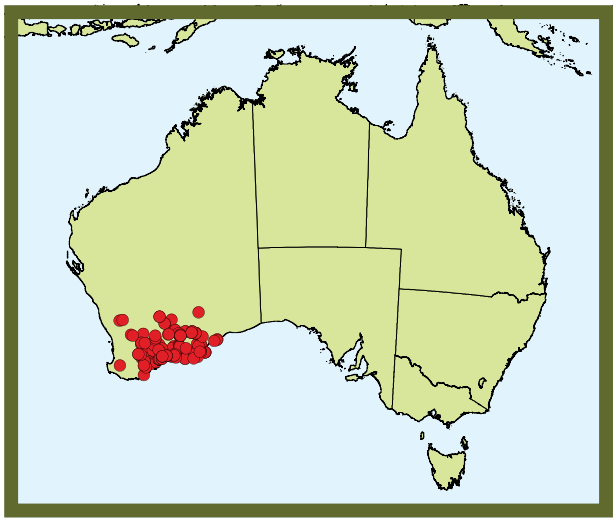


Melaleuca elliptica Labill.

PUBLICATION: *Novae Hollandiae plantarum specimen* 2: 31, t. 173 (1806)

DERIVATION: *elliptica*, from the Latin *ellipticus*, elliptic, in reference to the shape of the leaves

DESCRIPTION: ***Shrub or tree*** 0.6–4.5 m tall; bark papery, pale grey. ***Branchlets*** glabrescent, sericeous-pubescent. ***Leaves*** decussate (rarely in part alternate), 5.9–19.6 mm long, 3–10 mm wide, 1.1–2.7 times as long as wide, short-petiolate to subsessile; blade glabrescent, sericeous, elliptic, broadly elliptic, ovate, obovate or subcircular, in transverse section transversely linear, the base cuneate to truncate, the apex acute to rounded or obtusely shortly acuminate, the veins longitudinal-pinnate to longitudinal, 3–5 longitudinal veins, ***oil glands*** moderately dense, obscure to distinct, scattered. ***Inflorescences*** spicate, lateral, with 20–60 monads, up to 65 mm wide. ***Hypanthium*** hairy, 2.5–4 mm long. ***Calyx lobes*** abaxially glabrescent or hairy, 1.5–2 mm long, scarious in a marginal band 0.2–0.5 mm wide. ***Petals*** deciduous, 4.2–6.3 mm long. ***Stamens*** 12–33 per bundle; filaments deep pinkish-cream, pink to red or crimson-red, 10–27 mm long, the bundle claw 6.5–17.5 mm long, 0.7 times as long as the filaments. ***Style*** 10–31 mm long. ***Ovules*** 160–270 per locule. ***Fruit*** 4.8–6.2 mm long, with sepaline teeth; cotyledons planoconvex.



NATURAL OCCURRENCE: Western Australia: from the Bendering district south to the Ongerup district and eastwards to the western edge of the Nullarbor Plain. An isolated collection also exists from the Damboring district.

ECOLOGY: Recorded as occurring in mallee heathland, mallee woodland, eucalypt forest with dense shrub understorey, on sandy soil over granite, gravelly clay loam, silty soil, and granite.

FLOWERING TIME: Recorded as flowering from August to February and in April.

ESSENTIAL OILS: The leaf oil of this species was dominated by 1,8-cineole (68–76%). This was accompanied by lesser amounts of α-pinene (11–18%), limonene (2–4%) and α-terpineol (1–3%). Sesquiterpenes contributed little to the oil, with the principal components being globulol (0.6–0.9%) and spathulenol (0.4%).

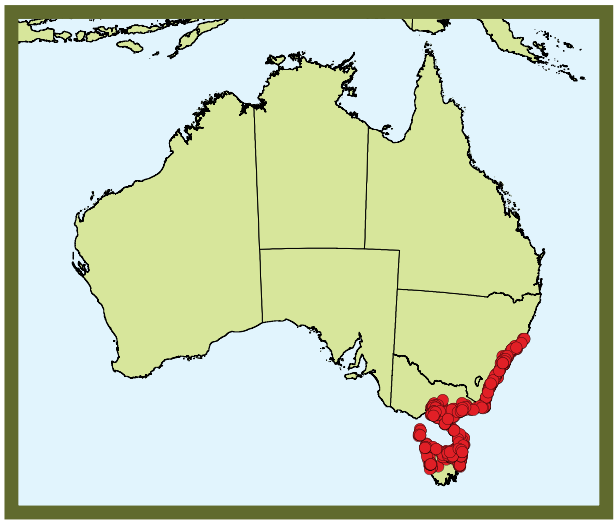
OIL YIELD: The oil yield (fresh weight, w/w) was 1.0–1.4%.

NOTES: This species is commonly cultivated as an ornamental shrub in temperate regions within Australia and apparently is adaptable to many well-drained soils.

Melaleuca ***ericifolia*** Sm.

PUBLICATION: *Transactions of the Linnean Society. London.* 3: 276 (1797)

DERIVATION: *ericifolia*, from *Erica*, a genus of Ericaceae, and the Latin *folium*, leaf, in reference to the perceived similarity between the leaves of this species and those of species of *Erica*



DESCRIPTION: ***Shrub or tree*** 1–8 m tall; bark papery-flaky, pale brownish or white. ***Branchlets*** glabrescent, lanuginulose. ***Leaves*** alternate or ternate, 5–18 mm long, 0.5–1.7 mm wide, 6–25 times as long as wide, subsessile; blade glabrescent, lanuginulose, very narrowly elliptic, very narrowly ovate, linear-elliptic, linear-ovate or linear, in transverse section flattened transversely semielliptic (occasionally approaching transversely elliptic or strongly flattened semitransversely elliptic), the base attenuate, the apex acute or narrowly acute, the veins longitudinal, 3, ***oil glands*** dense, distinct to obscure, scattered. ***Inflorescences*** spicate or capitate, pseudoterminal, with 10–40 monads, up to 20 mm wide. ***Hypanthium*** hairy or subglabrous, 1–1.8 mm long. ***Calyx lobes*** abaxially glabrous, 0.5–0.7 mm long, herbaceous to the margin. ***Petals*** deciduous, 1.2–2.2 mm long. ***Stamens*** 7–14 per bundle; filaments white or cream, 5–9 mm long, the bundle claw 1–2.5 mm long, 0.2–0.3 times as long as the filaments. ***Style*** 5–10.5 mm long. ***Ovules*** 30–45 per locule. ***Fruit*** 2.5–3.6 mm long, with sepaline teeth; cotyledons subobvolute (almost planoconvex).

NATURAL OCCURRENCE: New South Wales, Victoria, Tasmania: primarily coastal and subcoastal regions from the Hastings River district in New South Wales south to the Melbourne district in Victoria, and in Tasmania and Bass Strait Islands.

ECOLOGY: Recorded as occurring in heathland, swamp margins, wet sclerophyll forest, stream lines, coastal heath, on sand, alluvial clay, skeletal sandy soil on granite, coastal dunes, and gravelly sand.

FLOWERING TIME: Recorded as flowering from September to January and in May.

ESSENTIAL OILS: This species produced a monoterpenic oil. Chemotypes were not really present but there was a distinct association between oil composition and latitude. The more northerly provenances of this species were rich in linalool, while the more southerly provenances were rich in 1,8-cineole. There was a more or less gradual composition change for provenances between the two extremes. An example of a northern provenance oil gave linalool (55%), 1,8-cineole (13%), α-pinene (4%), terpinolene (3%) and α-terpineol (3%). A southern provenance oil gave 1,8-cineole (47%), linalool (0.1%), α-pinene (16%), limonene (8%) and α-terpineol (7%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.8–2.0%.

REFERENCES ON ESSENTIAL OILS: Brophy 1999; Brophy and Doran 2004

NOTES: This species is recorded as being a hardy ornamental in temperate regions within Australia (Elliot and Jones 1993). The species forms clonal patches in the wild and, although this feature may be valuable for farm shelter belts etc., its suckering may make it unsuitable for planting close to lawn areas etc., as noted by Wrigley and Fagg (1993). The leafy brush is favoured by aviculturists in south-eastern Australia for providing nesting sites for finches and similar nest-building birds.

Melaleuca ***eulobata*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 875 (1999)

DERIVATION: *eulobata*, from the Greek *eu-*, well, thoroughly, truly and *lobos*, lobe, in reference to this species having well distinct calyx lobes

DESCRIPTION: *Shrub* to 2 m tall. *Branchlets* hairy, sericeous to minutely sericeous hairs. *Leaves* alternate, 10–18 mm long, 3–6 mm wide, 2.5–5 times as long as wide, subsessile to rarely short-petiolate; blade glabrescent, sericeous to minutely sericeous, narrowly obovate or rarely obovate, in transverse section transversely linear, the base attenuate, the apex acuminate or obtusely shortly acuminate, the veins pinnate or longitudinal-pinnate, 5(–7) longitudinal veins, *oil glands* moderately dense, distinct to obscure, scattered. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 4–7 triads, up to 22 mm wide. *Hypanthium* hairy, 1.3–1.5 mm long. *Calyx lobes* abaxially hairy or glabrescent, 0.6–0.8 mm long, scarious throughout or rarely scarious in a marginal band 0.4–0.5 mm wide. *Petals* caducous, 1–1.7 mm long. *Stamens* 9–10 per bundle; filaments purple, 6.3–8.2 mm long, the bundle claw 2–2.7 mm long, 0.3–0.4 times as long as the filaments. *Style* 10–11 mm long. *Ovules* 10–15 per locule. *Infructescences* globose. *Fruit* 2.5–3.5 mm long, the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Shark Bay district.

ECOLOGY: Recorded as occurring in scrubland.

FLOWERING TIME: Recorded as flowering in September and October.

ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal component was 1,8-cineole (70%). This was accompanied by lesser amounts of β-pinene (8.0%), limonene (4.3%), sabinene (2.5%), myrcene (1.4%) and α-terpineol (5.1%). The principal sesquiterpenes encountered were bicyclogermacrene, globulol, spathulenol, β-caryophyllene, aromadendrene and α-humulene (all <0.7%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.9%.

Melaleuca ***eurystoma*** Barlow ex Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 875 (1999)

DERIVATION: *eurystoma*, from the Greek *eurys*, wide, broad, and *stoma*, mouth, in reference to the broad orifice of the fruit

DESCRIPTION: *Shrub* 0.4–1.5 m tall. *Branchlets* glabrous or glabrescent (when present, the hairs puberulous). *Leaves* alternate, 4.2–8.7 mm long, 3–6.1 mm wide, 1.2–2.4 times as long as wide, subsessile to short-petiolate; blade glabrous or glabrescent (when present, the hairs puberulous or lanuginulose-puberulous to lanuginulose), elliptic to broadly elliptic or broadly obovate, in transverse section lunate, the base cuneate (rarely approaching rounded-truncate), the apex obtuse to rounded, the veins longitudinal, 3–5, *oil glands* moderately dense, obscure, scattered. *Inflorescences* spicate or capitate, pseudoterminal or lateral, with 5–20 monads, up to 25 mm wide. *Hypanthium* glabrous or subglabrous, 1.8–2.8 mm long. *Calyx lobes* abaxially glabrous or subglabrous, 1–2 mm long, scarious in a marginal band 0.3–0.4 mm wide. *Petals* deciduous, 2.5–3.5 mm long. *Stamens* 7–15 per bundle; filaments yellow or pale yellow-green, 7–12 mm long, the bundle claw 4–5.5 mm long, 0.5–0.6 times as long as the filaments. *Style* 7.5–12 mm long. *Ovules* 70–85 per locule. *Fruit* 3.5–5 mm long, with sepaline teeth; cotyledons flattened planoconvex.

NATURAL OCCURRENCE: Western Australia: from the Corrigin district to the Lake King district and southwards to the Condingup district.

ECOLOGY: Recorded as occurring in heathland, mallee woodland, *Melaleuca* shrubland with mallees, on shallow sand on clay, lateritic loam, and sandy gravel.

FLOWERING TIME: Recorded as flowering from July to October.

ESSENTIAL OILS: This species produced a mainly monoterpenoid oil, though there were significant amounts of sesquiterpenes present. The major monoterpenes were α-pinene (14.0%) and β-pinene (22.6%). These were accompanied by lesser amounts of limonene (5.0%), and α-terpineol (1.1%). The principal sesquiterpene encountered was spathulenol (14.6%), with lesser amounts of globulol (3.8%), viridiflorol (2.0%), bicyclogermacrene (3.2%) and γ-, α- and β-eudesmol (2.9%, 4.2% and 1.4%, respectively).

OIL YIELD: The oil yield (dry weight, w/w) was 1.2%.

Melaleuca ***eximia*** (K.J.Cowley) Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 876 (1999)

DERIVATION: *eximia*, from the Latin *eximius*, exceptional, extraordinary, in reference to the attractiveness of this species when in flower

SYNONYM: *Melaleuca coccinea* subsp. *eximia* K.J.Cowley

DESCRIPTION: *Shrub* 2–3 m tall. *Branchlets* hairy, lanuginose to lanuginose-pubescent. *Leaves* decussate, peltate, 8–20 mm long, 1.2–2 mm wide, 8.3–14 times as long as wide, sessile; blade glabrescent, lanuginose to lanuginose-pubescent, subulate or linear-elliptic, in transverse section strongly sublunate, the base rounded to truncate, the apex acute, the veins longitudinal, 7–11, *oil glands* dense, obscure to distinct, scattered. *Inflorescences* spicate, lateral, with 7–13 triads, up to 60 mm wide. *Hypanthium* hairy, 2.1–2.5 mm long. *Calyx lobes* abaxially hairy, costate, 1.4–2.1 mm long, scarious in a marginal band up to 0.2 mm wide or herbaceous to the margin. *Petals* caducous, 2.2–3 mm long. *Stamens* 11–14 per bundle; filaments red, 18–25 mm long, the bundle claw 11–15 mm long, 0.5–0.6 times as long as the filaments. *Style* c. 18 mm long. *Ovules* 35–40 per locule. *Fruit* 4.5–5 mm long, with sepaline teeth or the calyx lobes weathering away.

NATURAL OCCURRENCE: Western Australia: the Mt Burdett – Mt Buraminya district.

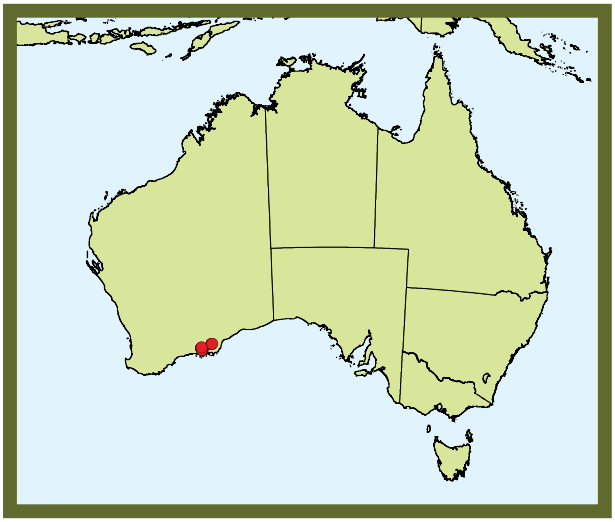
ECOLOGY: Recorded as occurring in shrubland, sand plain, on sandy soil, and sand at the base of outcropping granite.

FLOWERING TIME: Recorded as flowering in November.

ESSENTIAL OILS: The leaf oil of this species contained significant amounts of both mono- and sesquiterpenes. The principal monoterpenes were α-pinene (14–17%) and 1,8-cineole (11–17%). There were lesser amounts of limonene (0.8–2.0%), pinocarvone (1–3%), trans-pinocarveol (1–4%) and α-terpineol (1–3%). The sesquiterpenes were dominated by γ-eudesmol (17–21%), α-eudesmol (8–11%) and β-eudesmol (14–18%), with lesser amounts of globulol (1–6%) and E,E-farnesol (1–7%).

OIL YIELD: The oil yield (fresh weight, w/w) was 1.0–1.5%.

NOTES: This species has been successfully grown in Adelaide, South Australia, and may well prove to be a useful ornamental in other temperate climates.



Melaleuca exuvia Craven & Lepschi

PUBLICATION: in Craven, Lepschi, Broadhurst & Byrne, *Australian Systematic Botany* 17: 262 (2004)

DERIVATION: *exuvia*, from the Latin *exuvia*, cast skin, slough, in reference to the peeling, minni ritchi–style bark that is characteristic of several species of *Acacia*

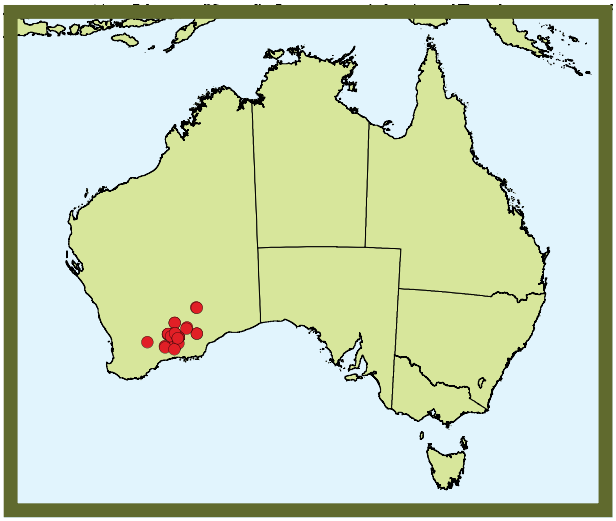
DESCRIPTION: *Tree or shrub* to 6 m tall; bark papery, peeling in large curls (similar to minni ritchi bark but much more coarse) and the stems becoming smooth. *Branchlets* glabrescent, sericeous-pubescent or sericeous. *Leaves* ascending or spreading-ascending, 7–30 mm long, 0.6–1.3 mm wide, 6–30 times as long as wide, petiole 0.2–0.8 mm long; blade glabrescent, sericeous-pubescent (occasionally with a few sericeous-lanuginose hairs) or sericeous, linear or linear-elliptic, in transverse section circular, subcircular, transversely elliptic or transversely narrowly elliptic, in lateral view straight, incurved or recurved, the base narrowly cuneate or very narrowly cuneate, the apex acuminate, narrowly acuminate, aristate or narrowly acute, recurved, *oil glands* scattered. *Inflorescences* capitate, with 3–8 triads. *Hypanthium* 0.8–1.2 mm long, 0.9–1.6 mm wide. *Calyx lobes* usually 5 or sometimes 4, connate at the base or indistinctly free, abaxially hairy, 0.2–0.7 mm long (usually 0.2–0.4 mm). *Petals* broadly elliptic, broadly ovate, broadly obovate, subcircular or broadly suboblong, rarely broadly obovate, 1–1.4 mm long, oil glands narrowly elliptic or linear, rarely subcircular. *Stamens* 5–8 per bundle, the filaments white to yellow, 4–4.5 mm long, the bundle claw 1.8–2.1 mm long, 0.4–0.5 times as long as the filaments. *Style* 5.6–6.2 mm long. *Ovules* 12–21 per locule. *Infructescences* longer than wide (rarely as wide as long and very rarely shorter than wide), 5–8.7 mm wide, the constituent fruits closely packed and not retaining a significant separate identity (the fruiting hypanthia closely packed for their full length). Seeds 0.5–0.9 mm long, the cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: from the Lake Johnston – upper Lort River district north-eastwards to the Queen Victoria Spring district.

ECOLOGY: Recorded as occurring in *Melaleuca* shrubland with scattered eucalypts, on whitish sandy loam at edge of salt lake, and on whitish sand along a drainage channel.

FLOWERING TIME: Recorded as flowering from October to December.

ESSENTIAL OILS: This species occurred in two, possibly three, chemotypes, all of which were monoterpenoid in nature. Chemotype I contained 1,8-cineole (57–67%) as the principal component with lesser amounts of α-pinene (13–22%), β-pinene (1–3%), limonene (3–5%) and α-terpineol (2–7%). Chemotype II contained 1,8-cineole (28–38%) and terpinen-4-ol (11–17%) as principal components, with lesser amounts of α-pinene (5–7%), limonene (3–4%), γ-terpinene (3–6%), α-terpineol (3–4%) and α-, β- and γ-eudesmol (each 4–7%). Chemotype III contained terpinen-4-ol (22–28%), linalool (16–26%) and γ-terpinene (7–11%) as principal components. These were accompanied by lesser amounts of α-pinene (3–6%), sabinene (4–6%), α-terpinene (4–7%), p-cymene (3–6%) and α-terpineol (1–3%).



OIL YIELD: The oil yields (fresh weight, w/w) were 1.3–2.1% for chemotype I, 1.3% for chemotype II and 2.0–2.3% for chemotype III.

REFERENCE ON ESSENTIAL OILS: Brophy et al. 2006b

NOTES: *Melaleuca exuvia* may have potential for use in shelter-belt plantings in semi-arid, semi-saline situations and is worth trialling as an ornamental shrub in dry to semi-arid regions. It grows to 6 m tall and has extremely attractive bark. Trees that produce chemotype III could be investigated further because of their good oil yield and the predominance of linalool and terpinen-4-ol.

Melaleuca fabri Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 876 (1999)

DERIVATION: *fabri*, from the Latin *faber*, craftsman, smith, in honour of Basil and Mary Smith of Manmanning, Western Australia, both of whom have a strong knowledge of the flora of the Wongan Hills – Manmanning region and have been very helpful to botanists working on the flora of this area

DESCRIPTION: *Shrub or tree* 1–1.5 m tall. *Branchlets* glabrescent, sericeous-pubescent. *Leaves* alternate, 35–110 mm long, 6.5–15 mm wide, 2.5–10 times as long as wide, short-petiolate to long-petiolate; blade glabrescent, pubescent to sericeous-pubescent, narrowly oblong or occasionally approaching narrowly-elliptic or very narrowly ovate, in transverse section transversely linear, the base attenuate, the apex acuminate, obtusely shortly acuminate, acute or obtuse, the veins longitudinal, 5(–7), *oil glands* dense or moderately dense, obscure, scattered. *Inflorescences* spicate, pseudoterminal or lateral, with 12–18 triads, up to 35 mm wide. *Hypanthium* hairy, 2.5–3.5 mm long. *Calyx lobes* abaxially hairy, 0.5–1.2 mm long, scarious in a marginal band 0.4–0.5 mm wide. *Petals* deciduous, 2.3–4 mm long. *Stamens* 9–13 per bundle; filaments pink, purple or mauve-pink, 10.8–13 mm long, the bundle claw 2.8–5 mm long, 0.3–0.4 times as long as the filaments. *Style* 14.5–16.5 mm long. *Ovules* 15–20 per locule. *Infructescences* globose. *Fruit* 3–4.5 mm long, the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: from the Morawa – Monger Lake district to the Wubin – Mt Gibson district.

ECOLOGY: Recorded as occurring in dense shrubland, mallee, *Acacia* scrubland, sand plain, on sand, loam, laterite, and granite.

FLOWERING TIME: Recorded as flowering from September to November.

ESSENTIAL OILS: This species presented an oil in which both monoterpenes and sesquiterpenes were significant. The principal monoterpenes were 1,8-cineole (18.0%), trans-pinocarveol (12.2%), myrtenal (7.1%), α-terpineol (6.3%) and pinocarvone (4.1%). The main identified sesquiterpenes were elemol (1.2%) and cubenol (1%), but there were significant oxygenated sesquiterpenes that were not identified and these amounted to over 30% of the oil.

OIL YIELD: The oil yield (dry weight, w/w) was 1%, but was obtained on a very small sample and is probably not reliable.

NOTES: Herbarium specimens of *M. fabri* previously were identified as *M. oldfieldii*, which is a very different plant. It seems to be easy to grow (Holliday 2004) in South Australia at least and should be trialled elsewhere for it is a very ornamental plant.

Melaleuca faucicola Craven

PUBLICATION: *Novon* 16: 471 (2006)
DERIVATION: *faucicola*, from the Latin *faux*, throat, hence gorge, and *-cola*, inhabitant or dweller, in reference to the habitat in which this species occurs
SYNONYM: *Callistemon pauciflorus* R.D.Spencer & Lumley
DESCRIPTION: *Tree or shrub* 1.2–15 m tall; bark fissured, dark. *Branchlets* glabrescent, sericeous or sericeous-pubescent. *Leaves* alternate, 25–89 mm long, 3.5–16 mm wide, 4–18 times as long as wide, short-petiolate; blade glabrescent, sericeous, narrowly elliptic, linear-elliptic, narrowly obovate or rarely elliptic, in transverse section transversely linear, sublunate or obsublunate, the base very narrowly attenuate, very narrowly cuneate or narrowly cuneate, the apex shortly acuminate or narrowly acute, the veins longitudinal-pinnate, 16–20, *oil glands* moderately dense, dense or sparse, distinct, scattered. *Inflorescences* spicate, pseudoterminal or interstitial, with 7–17 monads, 20–27 mm wide. *Hypanthium* hairy, 2–3.4 mm long. *Calyx lobes* abaxially hairy, 0.9–1.7 mm long, scarious in a marginal band 0.4–0.6 mm wide. *Petals* deciduous, 2.5–4.4 mm long. *Stamens* free or with most free but some fused into bundles, 52–71 per flower; filaments red, pink, cream or white, 6.8–10 mm long; anthers yellow. *Style* 8.5–16 mm long. *Ovules* c. 100–125 per locule. *Fruit* 2.8–4.5 mm long, the calyx lobes deciduous; cotyledons obvolute.

NATURAL OCCURRENCE: Northern Territory: the ranges of Central Australia.
ECOLOGY: Recorded as occurring in protected gorges, on sandstone, and quartzite.
FLOWERING TIME: Recorded as flowering from January to December.
ESSENTIAL OILS: This species produced a monoterpenoid oil. The principal components were α-pinene (15–16%) and 1,8-cineole (55–59%), with lesser amounts of β-pinene (1–6%), isobutyl isobutyrate (0.7–6.0%), limonene (5–7%) and α-terpineol (8–9%). The main sesquiterpene was spathulenol (0.1–0.3%).
OIL YIELD: The oil yield (fresh weight, w/w) was 0.2%.
REFERENCE ON ESSENTIAL OILS: Brophy et al. 1998, as *Callistemon pauciflorus*
NOTES: This species typically has some of the staminal filaments in each flower fused into distinct bundles, the remaining stamens in the flower being free from each other.

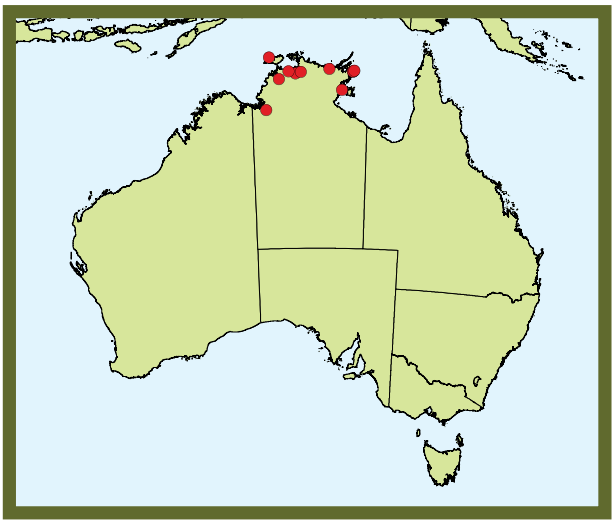
Melaleuca ferruginea Craven & Cowie

PUBLICATION: in Craven & Cowie, *Blumea* preprint: 2 (2011). [Craven, L.A. and Cowie, I.D. 2011. Taxonomic notes on the broad-leaved paperbarks (Myrtaceae, *Melaleuca*), including the description of one new species from northern Australia and a key to all taxa. 1–11. Preprint from *Blumea*. Subsequently printed in Blumea 57: 207–209 (2013).]

DERIVATION: *ferruginea*, from the Latin *ferrugineus*, rusty, light reddish brown, in reference to the colour of the bark

DESCRIPTION: *Tree* to 16 m tall; old outer bark white to brown, new bark reddish, soft, papery. *Branchlets* glabrescent, with an outer layer of pubescent hairs and a very dense understorey of lanuginulose hairs. *Leaves* alternate, distinctly dorsiventral, 70–160 mm long, 12–28 mm wide, 3.8–8.8 times as long as wide, petiole 5–12 mm long; blade glabrescent, the indumentum as on the branchlets but pubescent hairs less frequent, narrowly elliptic, subfalcate or falcate, in transverse section transversely linear, the base narrowly cuneate or cuneate, the apex acute, narrowly acuminate or sometimes obtuse, recurved, the veins longitudinal, 5–7, *oil glands* obscure, scattered. *Inflorescences* spicate with 10–15 triads, usually in the axils of distal leaves, occasionally several occurring at a branchlet apex (with some in the axils of the distal leaves and the others apparently terminal), sometimes the inflorescences are below the leaves, the rachis indumentum with pubescent and lanuginulose hairs, (17–)20–30 mm wide. *Hypanthium* glabrescent, or remaining hairy, the indumentum with pubescent and lanuginulose hairs (sometimes only pubescent hairs present), broadly vase-shaped or cup-shaped, 34 mm long, 34 mm wide. *Calyx lobes* 5, connate at the base, abaxially hairy, not costate, herbaceous in the proximal-central zone and scarious in a broad marginal band, the band c. 0.2 mm wide, very broadly triangular; 0.7 mm long. *Petals* glabrous (a few sparse cilia sometimes present), obscurely clawed, subcircular, 2.5–3.5 mm long. *Stamens* in 5 distinct bundles, or occasionally solitary free stamens occur between the bundles, 5–7 per bundle; filaments glabrous, white, 7–11 mm long, bundle claw 2–2.5 mm long and 2.8–5.5 times as long as the filaments; anthers oblong or elliptic, 0.7–1.1 mm long. *Style* glabrous, 7.5–11 mm long. *Ovules* c. 40–120 per locule. *Fruit* not early dehiscent and apparently persisting for 1 year or more, cup- or squat barrel–shaped, 2–3.5 mm long, 3.3–5 mm wide, 0.6–0.8 times as long as wide, 1.8–2.5 mm wide at the orifice. Seeds angular narrowly obovoid, 0.8–1 mm long, testa membranous, cotyledons about half the length of the embryo, obvolute.

NATURAL OCCURRENCE: Northern Territory: mainly subcoastal regions in the Top End.



ECOLOGY: Recorded as occurring on low areas beside billabong, in swale of coastal dunes, as scattered trees on flood plain, in seasonal sandy swamp, on outer edge of riparian forest, on levee bank beside creekline, in paperbark woodland, on a sandy chenier, on a sandy drainage flat, and as forming a community near mangroves; usually in seasonally inundated habitats.

FLOWERING TIME: Recorded as flowering in September and October.

ESSENTIAL OILS: This species presented a monoterpenoid leaf oil. The principal components identified were 1,8-cineole (9%), α-terpinyl acetate (34%) and α-terpineol (6%). These were accompanied by lesser amounts of limonene (0.8%), terpinen-4-ol (2.0%), δ-terpinyl acetate (0.7%), piperitone (0.4%), p-cymene-8-ol and geraniol (all <0.5%). Viridiflorol was the principal sesquiterpene encountered (7.2%), and there were lesser amounts of spathulenol (1.2%), cubeban-11-ol (1.1%), ledol (2%) and globulol (0.7%) identified. The analysis was performed on a small amount of 18-month-old air-dried sample. Oxidation of the oil contents did not appear to have taken place, though some of the more volatile components may have evaporated.

ESSENTIAL OIL YIELD: The oil yield (air-dried weight, w/w) was low.

Melaleuca filifolia F.Muell.

PUBLICATION: *Fragmenta phytographiae Australiae* 3: 119 (1862)

DERIVATION: *filifolia*, from the Latin *filum*, filament, and *folium*, leaf, in reference to the narrow leaves

DESCRIPTION: *Shrub* 0.4–2 m tall. *Branchlets* glabrescent, sericeous to sericeous-pubescent, rarely more or less pubescent. *Leaves* alternate, 10–35 mm long, 0.6–1.3 mm wide, 9–40 times as long as wide, sessile to subsessile; blade glabrescent, sericeous to sericeous-pubescent or occasionally the indumentum lanuginose-sericeous to lanuginose-pubescent and lanuginose, linear, in transverse section subcircular to circular or semicircular (rarely almost quadrate), the base truncate or parallel (blade width equals petiole width), the apex acute or obtuse to rounded, the veins longitudinal, 3, *oil glands* moderately dense or dense, distinct, scattered. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 6–13 triads, up to 23 mm wide. *Hypanthium* hairy, 1.5–1.8 mm long. *Calyx lobes* abaxially glabrous, 0.3–0.6 mm long, scarious in a marginal band 0.05–0.2 mm wide. *Petals* caducous, 1.7–2.5 mm long. *Stamens* 7–11 per bundle; filaments purple, mauve, mauve-pink or magenta, 6.8–10 mm long, the bundle claw 1–2.5 mm long, 0.1–0.3 times as long as the filaments. *Style* 9.5–11.5 mm long. *Ovules* 8–10 per locule. *Infructescences* globose. *Fruit* 2–3.5 mm long, the calyx lobes weathering away or sometimes replaced by weakly developed sepaline teeth; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Kalbarri–Mullewa district.

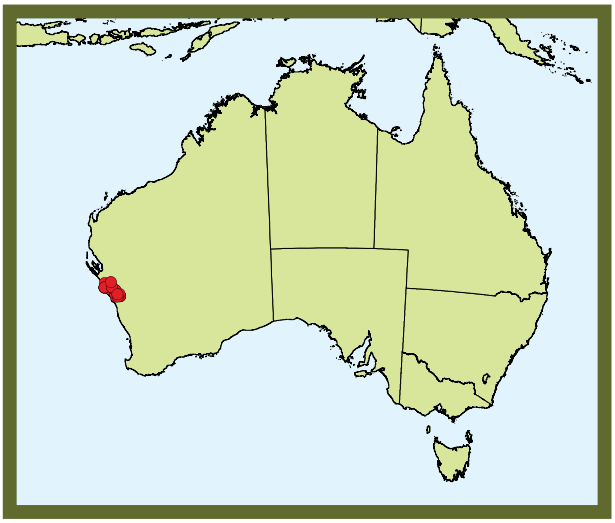
ECOLOGY: Recorded as occurring in low open heathland, dense low shrubland, coastal sand plain, on sand, and sandy clay loam.

FLOWERING TIME: Recorded as flowering from October to February.

ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal component was β-pinene (58%) and there were lesser amounts of α-pinene (9.0%), limonene (1.4%), myrcene (2.4%) and α-terpineol (3.5%). There was a significant number of sesquiterpenes present in the oil but they did not contribute significantly to the oil. The major members were globulol (3.6%), bicyclogermacrene (3.0%) and viridiflorol (1.1%)

OIL YIELD: The oil yield (fresh weight, w/w) was 0.9%.

NOTES: *Melaleuca filifolia* and *M. nematophylla* have been confused almost continuously since their original description. The leaves of *M. filifolia* are 10–35 mm in length and sericeous to sericeous-pubescent and its petals are caducous; in *M. nematophylla*, the leaves are 55–155 mm long and glabrous or sometimes sericeous-pubescent to pubescent, and the petals are deciduous. *Melaleuca filifolia* is in cultivation in South Australia to a limited extent.



Melaleuca fissurata Barlow

PUBLICATION: in Quinn, Cowley, Barlow & Thiele, *Nuytsia* 8: 336, fig. 1b (1992)

DERIVATION: *fissurata*, from the Latin *fissura*, crack, cleft, in reference to the cracked surface of the fruiting hypanthium

DESCRIPTION: *Shrub* 0.5–4 m tall; bark rough. *Branchlets* glabrescent, lanuginulose. *Leaves* alternate, 3–5 mm long, 1.5–3 mm wide, 1.3–2.3 times as long as wide, subsessile to short-petiolate; blade glabrescent (the lanuginulose hairs ephemeral), elliptic to broadly elliptic, in transverse section lunate, the base cuneate, the apex obtuse to rounded or broadly acute, the veins longitudinal, 5–6, *oil glands* sparse, obscure to distinct, more or less in rows. *Inflorescences* capitate, lateral, with 1–5 monads, up to 25 mm wide. *Hypanthium* glabrous, 2–3.4 mm long. *Calyx lobes* abaxially glabrous, 1.5–2.5 mm long, herbaceous to the margin. *Petals* deciduous, 2–4.7 mm long. *Stamens* 10–16 per bundle; filaments white or yellow, 6–13 mm long, the bundle claw 2–4.5 mm long, 0.4–0.5 times as long as the filaments. *Style* 10–14.5 mm long. *Ovules* 95–110 per locule. *Fruit* 5–7 mm long, with sepaline teeth; cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: from the Hyden district to the Scaddan district.

ECOLOGY: Recorded as occurring in open shrub mallee, low heath, mixed mallee woodland, on clay, and sand over loamy clay.

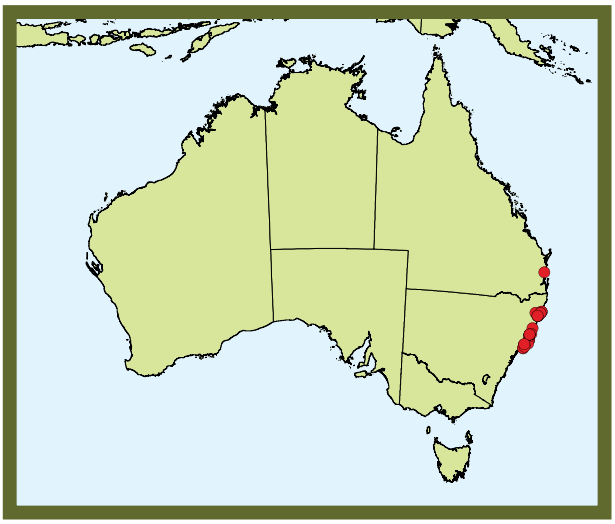
FLOWERING TIME: Recorded as flowering from July to September.

ESSENTIAL OILS: Monoterpenes were the major components contributing to the essential oil of this species. The principal monoterpenes were 1,8-cineole (44.8%), α-pinene (9.6%), β-pinene (12.6%), limonene (6.5%) and α-terpineol (2.3%). The principal sesquiterpenes encountered were spathulenol (8.6%), globulol (1.8%) and viridiflorol (1.6%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.1%.

Melaleuca flammea Craven

PUBLICATION: *Novon* 16: 471 (2006)
DERIVATION: *flammea*, from the Latin *flammeus*, fiery or fiery-red, in reference to the colour of the staminal filaments
SYNONYM: *Callistemon acuminatus* Cheel
DESCRIPTION: *Shrub* 1.5–5 m tall; bark fibrous, hard, sometimes peeling in strips, dark. *Branchlets* glabrescent, sericeous-pubescent grading to long pubescent. *Leaves* alternate, 36–151 mm long, 6–31 mm wide, 4.5–11 times as long as wide, long- or short-petiolate; blade glabrescent, sericeous-pubescent grading to long pubescent, narrowly obovate or narrowly elliptic, in transverse section transversely linear, broadly v-shaped or 'bird-winged', the base very narrowly attenuate or very narrowly cuneate, the apex narrowly acute to acute, the veins longitudinal-pinnate, 12–33, *oil glands* sparse or moderately dense, distinct or obscure, scattered. *Inflorescences* spicate, pseudoterminal and rarely also upper axillary, with 25–120 monads, 40–70 mm wide. *Hypanthium* hairy, 2.9–3.9 mm long. *Calyx lobes* abaxially hairy, 1.1–1.6 mm long, herbaceous to the margin. *Petals* deciduous, 3–5.4 mm long. *Stamens* 20–32 per flower; filaments red, 21–29 mm long; anthers reddish. *Style* 26–34 mm long. *Ovules* c. 100–200 per locule. *Fruit* 3.9–5.5 mm long, the calyx lobes deciduous; cotyledons obvolute.
NATURAL OCCURRENCE: Queensland, New South Wales: the Nambour district of Queensland and the north coast region of New South Wales.
ECOLOGY: Recorded as occurring in open woodland, open forest, dry sclerophyll forest with shrubby understorey, crevices on cliff top, rocky mountain tops, on grey-brown sandy loam, skeletal conglomerate soil, and yellow podsolic soil.
FLOWERING TIME: Recorded as flowering from October to December.
ESSENTIAL OILS: The leaf oil of this species, produced in poor yield, was dominated by monoterpenes. The principal components were 1,8-cineole (54–57%), α-terpineol (8–14%) and limonene (5–8%). There were lesser amounts of terpinen-4-ol (2–3%), γ-terpinene (1–3%) and geranyl acetate (0.6–2.0%). The principal sesquiterpenes encountered were β-caryophyllene (0.6–3.0%), E-nerolidol (0.2–4.0%), globulol (1–3%) and spathulenol (1–5%).
OIL YIELD: The oil yield (fresh weight, w/w) was <0.1%.
REFERENCE ON ESSENTIAL OILS: Brophy et al. 1998, as *Callistemon acuminatus*
NOTES: Surprisingly, this species is not widely cultivated. It has very ornamental flowers and should thrive in subtropical and/or at least warm temperate regions.



Melaleuca ***flavovirens*** (Cheel) Craven

PUBLICATION: *Novon* 16: 471 (2006)

DERIVATION: *flavovirens*, from the Latin *flavus*, yellow, and *virens*, green, in reference to the colour of the staminal filaments

SYNONYMS: *Callistemon rugulosus* var. *flavovirens* Cheel; *Callistemon flavovirens* (Cheel) Cheel

DESCRIPTION: *Shrub* 0.7–3 m tall; bark corrugated. *Branchlets* glabrescent, pubescent overlaid with sericeous to sericeous-pubescent hairs or velutinous. *Leaves* alternate, 36–102 mm long, 4–11 mm wide, 6.5–11 times as long as wide, short- or long-petiolate; blade glabrescent, sericeous to sericeous-pubescent, or lanuginose, narrowly obovate, very narrowly obovate or narrowly elliptic, in transverse section transversely linear, 'bird-winged' or obsublunate, the base very narrowly attenuate or very narrowly cuneate, the apex acute, very shortly acuminate or obtusely shortly acuminate, the veins pinnate, 8–16, *oil glands* sparse or moderately dense, distinct, scattered. *Inflorescences* spicate, pseudoterminal or interstitial, with 15–40 monads, 35–55 mm wide. *Hypanthium* hairy, 3.4–4.8 mm long. *Calyx lobes* abaxially hairy or glabrescent, 1.7–2.5 mm long, herbaceous to the margin or scarious in a marginal band 0.4–0.6 mm wide. *Petals* deciduous, 3.9–6.1 mm long. *Stamens* 34–38 per flower; filaments cream, whitish, greenish-yellow or pale green, 15–23 mm long; anthers apparently yellowish. *Style* 18–29 mm long. *Ovules* c. 400–500 per locule. *Fruit* 5.7–8.2 mm long; the calyx lobes deciduous; cotyledons obvolute.

NATURAL OCCURRENCE: Queensland, New South Wales: montane and tableland country in the border ranges region extending south.

ECOLOGY: Recorded as occurring in dense shrubland, open heath, riparian scrub, eucalypt forest along a creek, mountain tops in cracks of boulders, on granite, and skeletal granite soils.

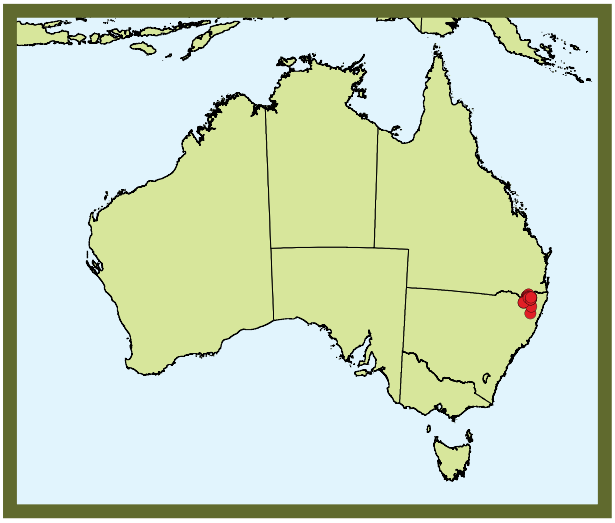
FLOWERING TIME: Recorded as flowering from May to December.

ESSENTIAL OILS: This species produced an oil that was dominated by 1,8-cineole (71–76%). There were lesser amounts of the monoterpenes α-pinene (7–10%), limonene (5–6%), linalool (0.7–1.0%) and α-terpineol (5–8%). Sesquiterpenes did not contribute much to the oil, with the most prominent members being globulol, viridiflorol and spathulenol (each being <0.5%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.4–0.5%.

REFERENCE ON ESSENTIAL OILS: Brophy et al. 1998, as *Callistemon flavovirens*, *C.* sp. nov. aff. *flavovirens*

NOTES: Populations in the Torrington area of New South Wales require further investigation as they may represent a distinct species.



Melaleuca fluviatilis Barlow

PUBLICATION: in Craven & Barlow, *Novon* 7: 116, fig. 2A–D (1997)

DERIVATION: *fluviatilis*, from the Latin *fluviatilis*, pertaining to rivers

DESCRIPTION: *Tree or shrub* 2.5–30 m tall; bark papery (also recorded as fibrous), white, grey or pale grey-brown. *Branchlets* glabrescent, the indumentum variable (pubescent hairs overlying short lanuginulose-puberulous to lanuginulose hairs; pubescent to sericeous-pubescent hairs overlying lanuginulose hairs; sericeous-pubescent to pubescent hairs overlying short lanuginulose-puberulous to lanuginulose hairs; or pubescent hairs overlying short puberulous to lanuginulose-puberulous or lanuginulose hairs). *Leaves* alternate, 45–180 mm long, 5–19 mm wide, 5–20 times as long as wide, long-petiolate; blade glabrescent, the indumentum variable, usually dense lanuginulose (with some lanuginulose-puberulous hairs) overlaid with scattered appressed to ascending longish pubescent to sericeous-pubescent hairs, narrowly elliptic, very narrowly elliptic or narrowly obovate, in transverse section transversely linear, the base attenuate, the apex acuminate, narrowly acuminate or narrowly acute, the veins longitudinal, 5–7, *oil glands* moderately dense, distinct or obscure, more or less in rows. *Inflorescences* spicate, upper axillary, with 8–18 triads, up to 40 mm wide. *Hypanthium* hairy, 1.3–2 mm long. *Calyx lobes* abaxially glabrescent or hairy, 0.6–1.5 mm long, scarious in a marginal band up to 0.5 mm wide or herbaceous to the margin. *Petals* deciduous, 1.5–3.5 mm long. *Stamens* 3–9 per bundle; filaments white, yellow, greenish or creamy-green, 10–19 mm long, the bundle claw 0.5–2 mm long, approximately 0.1 times as long as the filaments. *Style* 15–20 mm long. *Ovules* 40–100 per locule (may be variable within a plant). *Fruit* 2.5–4 mm long, the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Queensland: from the Cape York Peninsula – Lawn Hill – Cloncurry region south-eastwards to the Rockhampton district.

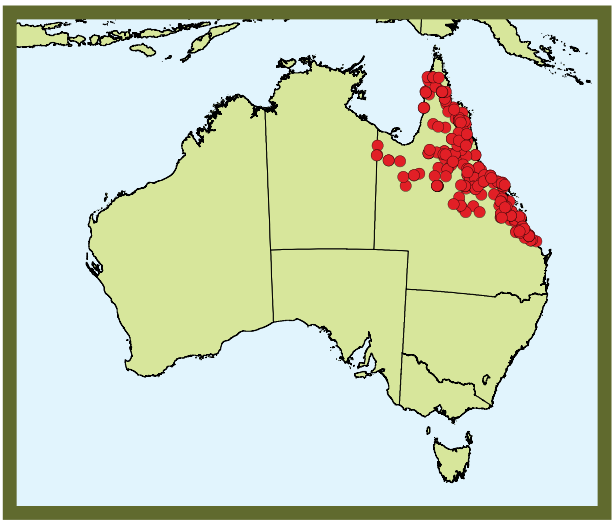
ECOLOGY: Recorded as occurring in riparian forest, margins of swampy open forest, low eucalypt woodland, on sand, granite along creek bed, basalt edges, and sandy and stony gravel.

FLOWERING TIME: Recorded as flowering from May to October.

ESSENTIAL OILS: The leaf oil of this species was decidedly monoterpenic in character. The principal components were α-pinene (25–30%), limonene (29–33%) and β-pinene (9–13%). There were also lesser amounts of 1,8-cineole (4–6%) and α-terpineol (1–4%). Sesquiterpenes, while numerous, did not contribute much to the oil. The principal members were β-caryophyllene (0.8–3.0%), aromadendrene (2–4%), allo-aromadendrene (1–2%), globulol (1–4%) and spathulenol (1–3%).

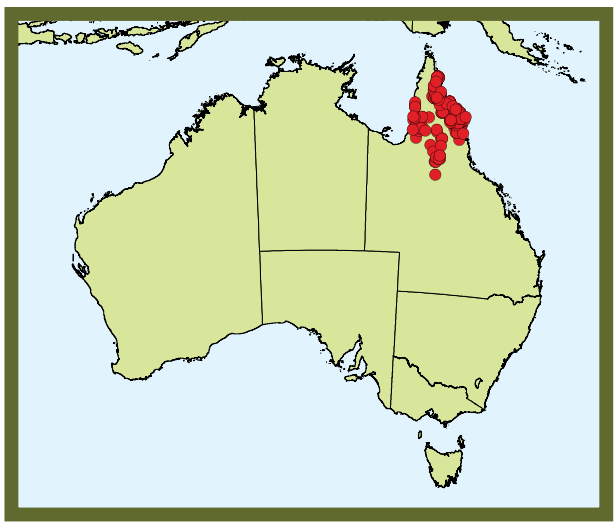
OIL YIELD: The oil yield (fresh weight, w/w) was 0.2%.

REFERENCE ON ESSENTIAL OILS: Brophy and Doran 1996.



Melaleuca foliolosa A.Cunn. ex Benth.

PUBLICATION: *Flora Australiensis* 3: 162 (1867)
DERIVATION: *foliolosa*, from the Latin *folium*, leaf, hence foliolose, in reference to the numerous, small leaves of this species
DESCRIPTION: ***Shrub or tree*** 2–10 m tall; bark papery, grey or white. ***Branchlets*** hairy, pubescent-lanuginose. ***Leaves*** decussate, peltate, 2–3.2 mm long, 0.8–1.8 mm wide, 1.7–3.7 times as long as wide, sessile; blade glabrescent, usually ciliate at the margin and rarely also lanuginulose-puberulous, angular-obovate, angular-elliptic or broadly angular-obovate, in transverse section shallowly lunate to semicircular or crescentic, the base truncate, the apex acute, the veins longitudinal, 9–17, ***oil glands*** dense, obscure, in rows. ***Inflorescences*** subcapitate or spicate, interstitial, with 2–8 monads, up to 15 mm wide. ***Hypanthium*** glabrous, 1.2–2 mm long.



Calyx lobes abaxially glabrous, costate, 0.8–1.1 mm long, scarious in a marginal band up to 0.2 mm wide or herbaceous to the margin. ***Petals*** deciduous, 1.8–2 mm long. ***Stamens*** 20–35 per bundle; filaments cream, white or greenish-white, 4.5–5.5 mm long, the bundle claw 2.5–3.5 mm long, 0.6–0.7 times as long as the filaments. ***Style*** 1.5–2 mm long. ***Ovules*** 40–60 per locule. ***Fruit*** 2.5–3.5 mm long, the calyx lobes persistent (the distal portion weathering away, leaving the basal tissue as small undulations or very blunt teeth on the rim); cotyledons subobvolute (almost planoconvex).
NATURAL OCCURRENCE: Queensland: central and southern Cape York Peninsula.
ECOLOGY: Recorded as occurring in woodland, savannah, heathy scrubland, on granite outcrops, sandstone ridges, sand, clay, and near coastal salt pans.
FLOWERING TIME: Recorded as flowering from April to October.
ESSENTIAL OILS: The leaf oil of this species was variable, but contained significant amounts of monoterpenes. The main components were terpinen-4-ol (23–40%), α-pinene (trace–8%), 1,8-cineole (1–8%), p-cymene (1–17%), geraniol (0.5–3.0%) and α-terpineol (5–10%). A second collection (JD 2056-8) contained less terpinen-4-ol (<8%) and more α-pinene (up to 30%) and a higher oil yield (0.6%). The principal sesquiterpenes identified in the oil were spathulenol (1–13%), caryophyllene oxide (0.5–6.0%) and E,E-farnesol (1–3%). There were a significant number of oxygenated sesquiterpenes present in amounts of <1%.
OIL YIELD: The oil yield (dry weight, w/w) was <0.1%.
REFERENCE ON ESSENTIAL OILS: Brophy and Doran 1996

Melaleuca formosa (S.T.Blake) Craven

PUBLICATION: *Novon* 16: 472 (2006)
DERIVATION: *formosa*, from the Latin *formosus*, handsome, beautiful, in reference to the appearance of this species
SYNONYM: *Callistemon formosus* S.T.Blake
DESCRIPTION: *Tree or shrub* 1.5–6 m tall; bark fibrous or papery, hard, grey or dark brown. *Branchlets* glabrescent, sericeous. *Leaves* alternate, 35–86 mm long, 3–9 mm wide, 7–15 times as long as wide, subsessile or short-petiolate; blade glabrescent, sericeous, very narrowly elliptic or very narrowly ovate, in transverse section transversely linear, the base very narrowly attenuate or very narrowly cuneate, the apex acute, the veins longitudinal-pinnate, 11–24, *oil glands* dense or moderately dense, distinct, scattered. *Inflorescences* spicate, pseudoterminal and sometimes also upper axillary, with 20–40 monads, 30–45 mm wide. *Hypanthium* hairy or glabrescent, 3–3.4 mm long. *Calyx lobes* abaxially glabrous or hairy (then on the margin only), 1.4–2.3 mm long, scarious in a marginal band 0.3–0.5 mm wide. *Petals* deciduous, 3.5–4.5 mm long. *Stamens* 57–63 per flower; filaments cream or white, 9–15 mm long; anthers yellow. *Style* 14–17 mm long. *Ovules* c. 100–150 per locule. *Fruit* 3.8–5.4 mm long, the calyx lobes deciduous; cotyledons obvolute.

NATURAL OCCURRENCE: Queensland: the south-eastern region.
ECOLOGY: Recorded as occurring in monsoonal or vine forest, *Melaleuca* thicket with eucalypt overstorey, shrubland, rainforest – eucalypt forest intergrade, on red loam, sandy soil over rhyolite, skeletal soil on trachyte, and sandstone.
FLOWERING TIME: Recorded as flowering from September to December.
ESSENTIAL OILS: This species gave a leaf oil dominated by monoterpenes. The principal components were 1,8-cineole (52–65%) and α-pinene (18–30%). These were accompanied by lesser amounts of limonene (4–6%), α-terpineol (6–7%) and terpinen-4-ol (0.3–2.0%). Sesquiterpenes were not plentiful and contributed less than 5% overall to the oil.
OIL YIELD: The oil yield (fresh weight, w/w) was 0.2–0.4%.
REFERENCE ON ESSENTIAL OILS: Brophy et al. 1998, as *Callistemon formosus*

Melaleuca fulgens R.Br.

TAXONOMY: Three subspecies are recognised in this species: subsp. *corrugata* (J.M.Black ex Eardley) K.J.Cowley, subsp. *fulgens* and subsp. *steedmanii* (C.A.Gardner) K.J.Cowley

PUBLICATION: Cowley, Quinn, Barlow & Craven, *Australian Systematic Botany* 3: 174 (1990), subsp. *corrugata*; Aiton, *Hortus Kewensis, ed. 2,* 4: 415 (1812), subsp. *fulgens*; Cowley, Quinn, Barlow & Craven, *Australian Systematic Botany* 3: 172 (1990), subsp. *steedmanii*

DERIVATION: *corrugata*, from the Latin *ruga*, wrinkle, crease, hence *corrugatus*, in reference to the surface of the fruiting hypanthium; *fulgens*, from the Latin *fulgens*, shining, bright-coloured, in reference to the bright red flowers; *steedmanii*, in honour of Henry Steedman (c. 1866–1953), one-time head gardener at the Perth (Western Australia) zoological gardens, and plant collector and seedsman

DESCRIPTION: *Shrub* 0.2–3 m tall. *Branchlets* glabrous. *Leaves* decussate, 8–35 mm long, 0.7–5.5 mm wide, 3.5–30 times as long as wide, subsessile; short-petiolate or sessile; blade soon glabrescent (the lanuginulose-puberulous to lanuginulose or puberulous hairs ephemeral), linear-elliptic, very narrowly elliptic, linear, very narrowly obovate or obovate, in transverse section sublunate, strongly sublunate, sublunate-involute, strongly sublunate-curved or transversely linear, the base attenuate, narrowly cuneate or cuneate, the apex narrowly acute to acute, acuminate or obtusely shortly acuminate, the veins longitudinal to longitudinal-pinnate (variable, the pinnate veins weakly developed), *oil glands* moderately dense or dense, distinct, scattered or more or less in rows. *Inflorescences* spicate, lateral, with 6–20 monads, up to 75 mm wide. *Hypanthium* glabrous, 2.7–4.2 mm long. *Calyx lobes* abaxially glabrous, 1–2.5 mm long, scarious in a marginal band 0.2–1 mm wide. *Petals* deciduous, 5.5–8.5 mm long. *Stamens* (rarely a 5th bundle may be imperfectly formed in that two bundles are not completely separated and are joined proximally for c. 2.5–3 mm) 22–80 per bundle; filaments red, pink, dark crimson, scarlet, dark rose-pink, bright pink, bright deep pink, pink or mauve, 11–27 mm long, the bundle claw 4.5–17 mm long, 0.4–0.7 times as long as the filaments. *Style* 10–27 mm long. *Ovules* 120–220 per locule. *Fruit* 4.8–7.2 mm long, with sepaline teeth or the calyx lobes weathering away; cotyledons obvolute to subobvolute (almost planoconvex).

NATURAL OCCURRENCE: **subsp. *corrugata*:** Western Australia, Northern Territory, South Australia: in the Petermann, Musgrave and Rawlinson Range systems in the border regions of the three states. **subsp. *fulgens*:** Western Australia: from the Paynes Find district south and eastwards to the Great Victoria Desert and the Israelite Bay district. **subsp. *steedmanii*:** Western Australia: from the Wannoo district to the Coorow district.

ECOLOGY: **subsp. *corrugata*:** Recorded as occurring along rocky drainage lines, on ridges and hill tops, on quartzite, and granite. **subsp. *fulgens*:** Recorded as occurring in shrubland, mallee heath, on granite, gravelly clay loam, sandy loam, and clayey sand. **subsp. *steedmanii*:** Recorded as occurring in heathland, tall grassy shrubland, on granite, sandstone, laterite, sandy loam, and wet clay.

FLOWERING TIME: **subsp. *corrugata*:** Recorded as flowering from April to September. **subsp. *fulgens*:** Recorded as flowering from June to April. **subsp. *steedmanii*:** Recorded as flowering from July to December.

ESSENTIAL OILS: **subsp. *corrugata*:** The leaf oil of this subspecies was dominated by 1,8-cineole (81.4%). There were lesser amounts of α-pinene (3.5%), β-pinene (1.6%), limonene (5.8%) and α-terpineol (2.0%). Sesquiterpenes contributed very little to the oil, accounting for

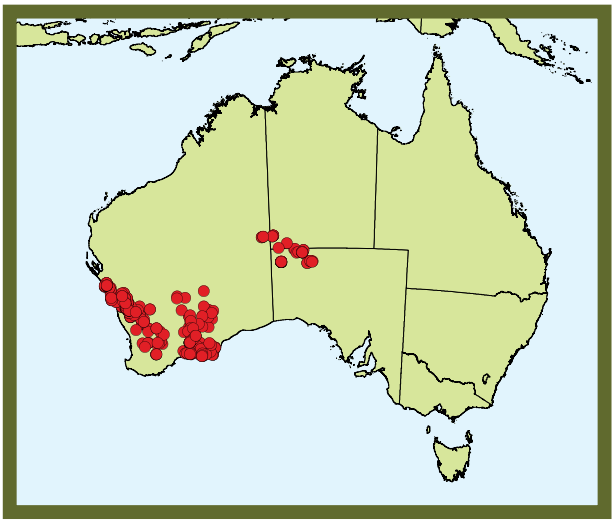
less than 5% overall. **subsp. *fulgens*:** The leaf oil of this subspecies was dominated by 1,8-cineole (72–75%). This was accompanied by lesser amounts of α-pinene (4–6%), limonene (6–7%), β-pinene (1–3%) and α-terpineol (1–2%). Sesquiterpenes did not contribute much to the oil, with the major components being globulol (1–2%) and viridiflorene (0.8–1.0%); no other component being greater than 0.5%. **subsp. *steedmanii*:** The leaf oil of this subspecies was dominated by monoterpenes. The principal monoterpene was 1,8-cineole (72–83%). This was accompanied by lesser amounts of α-pinene (3–10%), limonene (1–3%) and α-terpineol (2–3%). The principal sesquiterpenes were globulol (0.6%), viridiflorol (0.1–0.3%) and spathulenol (0.1–2.0%). No other sesquiterpene amounted to more than 0.3%.

OIL YIELD: **subsp. *corrugata*:** The oil yield (dry weight, w/w) was 2.2%. **subsp. *fulgens*:** The oil yield (fresh weight, w/w) was 1.2–1.5%. **subsp. *steedmanii*:** The oil yield (fresh weight, w/w) was 0.4–0.6%.

NOTES: The three subspecies are distinguished as follows: **subsp. *corrugata*:** Staminal filaments 11–13 mm long, the bundle claw 4.5–6.5 mm long, the filaments (including the claw) typically mauve or pink. **subsp. *fulgens*:** Staminal filaments 16.5–27 mm long, the bundle claw 11–17 mm long, the filaments (including the claw) typically red; leaf blade linear-elliptic, narrowly elliptic, linear or rarely very narrowly obovate. **subsp. *steedmanii*:** Staminal filaments 12–18 mm long, the bundle claw 7.5–13 mm long, the filaments (including the claw) typically red; leaf blade narrowly obovate (to linear when the margin is strongly incurved).

Melaleuca fulgens and *M. radula* may hybridise when they are in biotic sympatry and plants of hybrid origin often are difficult to recognise. Despite this, the two species appear to be amply distinct and worthy of separate recognition.

Selected forms of both subsp. *fulgens* and subsp. *steedmanii* are cultivated in subtemperate Australia where they have proved to be popular ornamental shrubs.



Melaleuca genialis Lepschi

PUBLICATION: in Craven, Lepschi & Cowley, *Nuytsia* 20: 28 (2010)

DERIVATION: *genialis*, from the Latin *genialis*, jovial, pleasant, in reference to staff at the Western Australian Herbarium in the 1990s

DESCRIPTION: *Shrub* to 1.2 m tall. *Branchlets* glabrescent, puberulous to lanuginulose-puberulous. *Leaves* alternate, 6.7–10 mm long, 0.8–1.1 mm wide, 6.8–14.4 times as long as wide, subsessile to short-petiolate; blade hairy, puberulous to sericeous-lanuginulose, linear to linear-obovate, in transverse section transversely broadly elliptic or transversely oblong, the base truncate, the apex acute but not pungent, 1-veined, *oil glands* moderately densely to densely distributed, distinct, scattered. *Inflorescences* capitate, pseudoterminal, with 5–7 triads, 11–14 mm wide. *Hypanthium* pubescent, 1.5–1.7 mm long. *Calyx lobes* abaxially hairy, pubescent to puberulous, not costate, transversely semielliptic, 0.5 mm long, scarious in a marginal band 0.1 mm wide, otherwise herbaceous. *Petals* deciduous, 0.8–1.1 mm long. *Stamens* 2–5 per bundle; filaments pink to mauve to purple, 4–5 mm long, the bundle claw 0.8–1.5 mm long, 0.2–0.4 times as long as the filaments. *Style* 6–7.5 mm long. *Ovules* 6–7 per locule. *Fruit* 2.5–3.3 mm long, with the distal rim having obtuse sepaline teeth. Seeds brown with membranous testa, cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: known only from Dongolocking Nature Reserve, near Wagin in the south-west.

ECOLOGY: Recorded as occurring in open woodland over shrubland, on brown clay or grey gravelly clay.

FLOWERING TIME: Recorded as flowering in October.

ESSENTIAL OILS: In this species, the monoterpenes and sesquiterpenes were present in roughly equal amounts. The principal monoterpenes encountered were α-pinene (17.3%) and 1,8-cineole (33.1%). These were accompanied by lesser amounts of α-terpineol (4.1%), limonene (1.5%) and β-pinene (0.9%). The principal sesquiterpenes present in the oil were α-cadinol (10.1%), T-cadinol (3.9%), T-muurolol (4.8%), spathulenol (4.8%), viridiflorol (3.9%), palustrol (1.4%) and δ-cadinene (1.2%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.3%.

Melaleuca gibbosa Labill.

PUBLICATION: *Novae Hollandiae plantarum specimen* 2: 30, t. 172 (1806)

DERIVATION: *gibbosa*, from the Latin *gibbosus*, gibbous, more swollen in one place than another, in reference to the fruit being embedded in the branchlet which becomes distinctly thickened or swollen in the fruiting zone

DESCRIPTION: *Shrub* 0.1–3 m tall. *Branchlets* usually glabrous or soon glabrescent (when present, the hairs—lanuginulose-puberulous to lanuginulose with some puberulous hairs also—are ephemeral). *Leaves* decussate, 1.5–6 mm long, 1–4 mm wide, 1–2.8 times as long as wide, subsessile to sessile; blade usually glabrous or soon glabrescent (the indumentum as for the branchlets), broadly obovate, obovate, broadly elliptic, elliptic or broadly ovate, in transverse section sublunate, lunate, sublunate-involute or V-shaped, the base cuneate to rounded or rarely approaching truncate, the apex rounded or broadly acute, the veins longitudinal, 3, *oil glands* moderately dense or dense, distinct or obscure, more or less in rows to scattered. *Inflorescences* spicate or capitate, with 4–18 monads, up to 12 mm wide. *Hypanthium* glabrous, 1–1.5 mm long. *Calyx lobes* abaxially glabrous, 0.5–0.9 mm long, scarious in a marginal band 0.1–0.4 mm wide. *Petals* deciduous, 1.3–2.6 mm long. *Stamens* 9–25 per bundle; filaments mauve, purple or pink, 3.5–5.5 mm long, the bundle claw 0.5–1.7 mm long, 0.2–0.4 times as long as the filaments. *Style* 5.5–7.5 mm long. *Ovules* c. 35–50 per locule. *Fruit* distinctly embedded in the rachis, with sepaline teeth (at maximum maturity the teeth have weathered to being blunt undulations or have weathered away completely); cotyledons planoconvex.

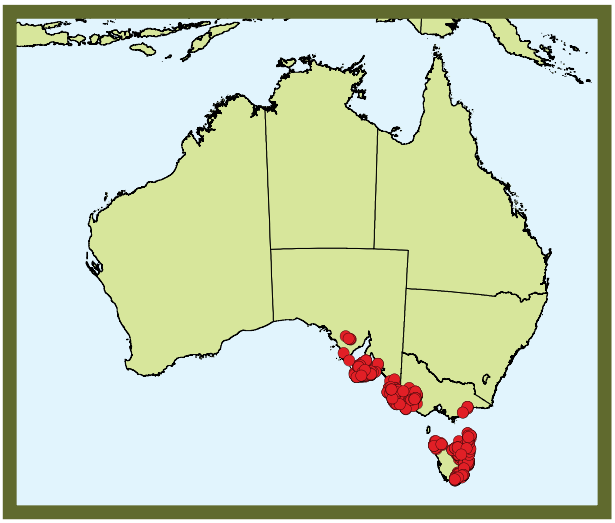
NATURAL OCCURRENCE: South Australia, Victoria, Tasmania: from the Eyre Peninsula of South Australia eastwards as far as the Gippsland region of Victoria; and north-western and eastern Tasmania.

ECOLOGY: Recorded as occurring in heathland, low open woodland, open scrub-swamp, eucalypt forest on flood plain, behind dunes on edge of lagoon, calcareous dunes, on sandy soil, sandy peats, and granite.

FLOWERING TIME: Recorded as flowering from August to May.

ESSENTIAL OILS: This species presented a monoterpenoid oil. The principal component was 1,8-cineole (58.6%). This was accompanied by lesser amounts of α-pinene (5.7%), limonene (7.3%), linalool (3.3%) and α-terpineol (3.0%). Sesquiterpenes were not numerous in this oil. The principal sesquiterpenes were β-caryophyllene (3.5%), caryophyllene oxide (1.0%), globulol (1.8%) and spathulenol (1.0%).

OIL YIELD: The oil yield (dry weight, w/w) was 1%.



Melaleuca glaberrima F.Muell.

PUBLICATION: *Fragmenta phytographiae Australiae* 3: 119 (1862)

DERIVATION: *glaberrima*, from the Latin *glaber*, glabrous, apparently in reference to the specimens studied by Mueller being glabrous

DESCRIPTION: *Shrub* 0.3–2.5 m tall. *Branchlets* soon glabrescent (the lanuginulose to lanuginulose-puberulous hairs ephemeral). *Leaves* alternate, 4–14 mm long, 0.5–1 mm wide, 4.7–11 times as long as wide, subsessile; blade soon glabrescent (the lanuginulose to, rarely, lanuginulose-puberulous hairs ephemeral), linear, subfalcate to falcate or linear-obovate, in transverse section subcircular, depressed obovate, transversely elliptic or circular, the base attenuate to narrowly cuneate, the apex obtusely shortly acuminate, acute or obtuse, the veins longitudinal, 1–2 (midrib, and often a second very minor lateral vein may occur also), *oil glands* moderately dense, obscure, more or less in rows. *Inflorescences* spicate, lateral, with 10–40 monads, up to 20 mm wide. *Hypanthium* glabrous, 1.5–1.8 mm long. *Calyx lobes* abaxially glabrous, 0.4–1 mm long, scarious in a marginal band up to 0.2 mm wide or herbaceous. *Petals* deciduous, 2–3 mm long. *Stamens* 8–20 per bundle; filaments pink or mauve, 5.5–12 mm long, the bundle claw 2–6 mm long, 0.5–0.6 times as long as the filaments. *Style* 7.5–12 mm long. *Ovules* 35–60 per locule. *Fruit* 2.8–4 mm long, with sepaline teeth; cotyledons planoconvex.

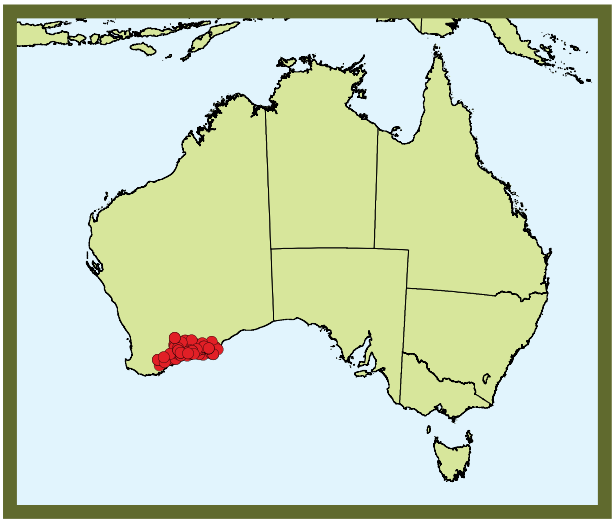
NATURAL OCCURRENCE: Western Australia: from the Stirling Range to the Cape Arid district.

ECOLOGY: Recorded as occurring in heathland, mallee heathland, closed woodland, open eucalypt woodland, on sand over clay, sand over laterite, granite, peaty sand, lateritic clay, and loamy sand.

FLOWERING TIME: Recorded as flowering from July to December.

ESSENTIAL OILS: The leaf oil from this species was dominated by monoterpenes. The principal components were 1,8-cineole (57–63%) and α-pinene (17–19%). These were accompanied by lesser amounts of limonene (7–8%), β-pinene, myrcene and α-terpineol (all 1–2%). The sesquiterpenes did not contribute much to the oil, with the major components being globulol (2–3%) and spathulenol (0.5%). All other sesquiterpenes were present in amounts less than 0.4%.

OIL YIELD: The oil yield (fresh weight, w/w) was 1.0–1.2%.



Melaleuca glauca (Sweet) Craven

TAXONOMY: *Melaleuca glauca* (Sweet) Craven, *comb. nov.*; *Metrosideros glauca* Bonpl. *Description des plantes rares cultivées à Malmaison et à Navarre* 86, t. 34 (1815), *nom. illeg.*; *Callistemon glaucus* Sweet, *Sweet's Hortus Britannicus, ed. 2,* 209 (1830), *basionym*

PUBLICATION: the present work

DERIVATION: *glauca*, from the Latin *glaucus*, glaucous, in reference to the glaucous nature of the leaves in the specimen studied by Bonpland

SYNONYMS: *Callistemon glaucus* (DC.) Sweet; *Callistemon speciosus* (Sims) Sweet; *Melaleuca paludosa* R.Br., *nom. rej.*; *Metrosideros glauca* Bonpl., *nom. illeg.*

DESCRIPTION: ***Shrub*** 1–3.5 m tall; bark fibrous, hard. ***Branchlets*** glabrescent, pubescent. ***Leaves*** alternate, 40–128 mm long, 3–18 mm wide, 6–15 times as long as wide, short-petiolate; blade glabrescent, sericeous-pubescent, linear-obovate, narrowly obovate, linear-elliptic, narrowly elliptic or narrowly suboblong-elliptic, in transverse section transversely linear, sublunate or obsublunate, the base very narrowly cuneate, the apex very shortly acuminate to acute, the veins longitudinal-pinnate, 11–20, ***oil glands*** sparse or moderately dense, obscure, scattered. ***Inflorescences*** spicate, pseudoterminal, with 20 – c. 120 monads, 50–75 mm wide. ***Hypanthium*** hairy, 4–6.8 mm long. ***Calyx lobes*** abaxially hairy or glabrescent, 2–2.7 mm long, herbaceous to the margin. ***Petals*** deciduous, 4.5–7.2 mm long. ***Stamens*** 6–15 per bundle; filaments red, 21–33 mm long, the bundle claw 0.5–2.8 mm long, c. 0.1 times as long as the filaments; anthers apparently red. ***Style*** 27–32 mm long. ***Ovules*** c. 360–500 per locule. ***Fruit*** 5.7–8.8 mm long, the calyx lobes deciduous; cotyledons obvolute to planoconvex.

NATURAL OCCURRENCE: Western Australia: the south-western and southern coastal region.

ECOLOGY: Recorded as occurring in swampy ground in low-lying jarrah forest, coastal *Banksia* heath, swamp on coastal plain, wet heath along drainage line in jarrah forest, ridges and swamp flats in jarrah woodland, on peat, and brown sandy clay over laterite.

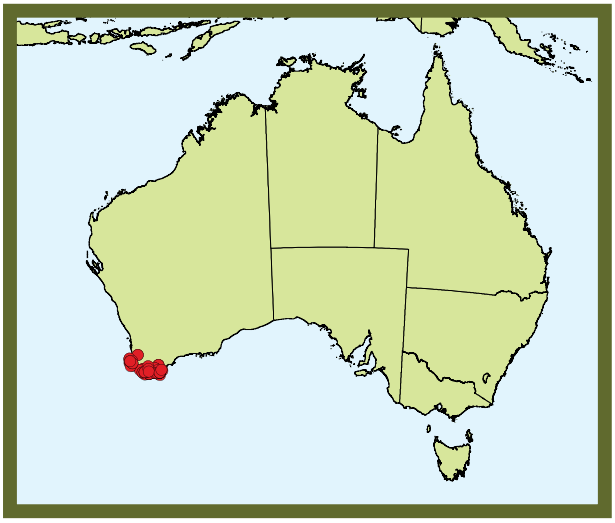
FLOWERING TIME: Recorded as flowering from October to December.

ESSENTIAL OILS: α-pinene (44–88%) dominated the oil of this species. It was accompanied by lesser amounts of 1,8-cineole (0.1–37.0%), limonene (1–4%) and α-terpineol (0.9–5.0%). Sesquiterpenes were neither plentiful nor abundant, with spathulenol (0.4–1.0%) being the most abundant compound. An unknown compound, molecular weight 236, suspected of being a phenol ether, was also present (2–6%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.2–0.5%.

REFERENCE ON ESSENTIAL OILS: Brophy et al. 1998, as *Callistemon glaucus*, *C. speciosus*

NOTES: This species is widely grown as an ornamental shrub in temperate Australia, succeeding even in dry areas as long as supplementary water is available.



Melaleuca glena Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 878 (1999)

DERIVATION: *glena*, from the Greek *glenos*, thing to stare at, wonder, in reference to the lateral inflorescences that are such a striking feature in this species

DESCRIPTION: *Shrub* 0.9–2 m tall; bark papery. *Branchlets* glabrous. *Leaves* alternate, 24–46 mm long, 6.5–10.5 mm wide, 2.8–6 times as long as wide, short-petiolate; blade glabrous, narrowly obovate, rarely narrowly elliptic or obovate, in transverse section transversely linear, the base attenuate, the apex obtusely shortly acuminate or rarely rounded to acute, the veins longitudinal, 5–7, *oil glands* dense, distinct to obscure, scattered. *Inflorescences* capitate or spicate, often lateral and sometimes pseudoterminal, with 5–12 triads, up to 15 mm wide. *Hypanthium* hairy, 1.2–2 mm long. *Calyx lobes* abaxially hairy or glabrescent, 0.2–0.4 mm long, scarious throughout or scarious in a marginal band 0.1–0.15 mm wide. *Petals* deciduous, 1.2–1.8 mm long. *Stamens* 4–7 per bundle; filaments deep mauve, 4–6.5 mm long, the bundle claw 0.9–2 mm long, 0.2–0.3 times as long as the filaments. *Style* 6.5–8.5 mm long. *Ovules* c. 15 per locule. *Infructescences* globose. *Fruit* 2.5–3.5 mm long, the calyx lobes weathering away; cotyledons obvolute.

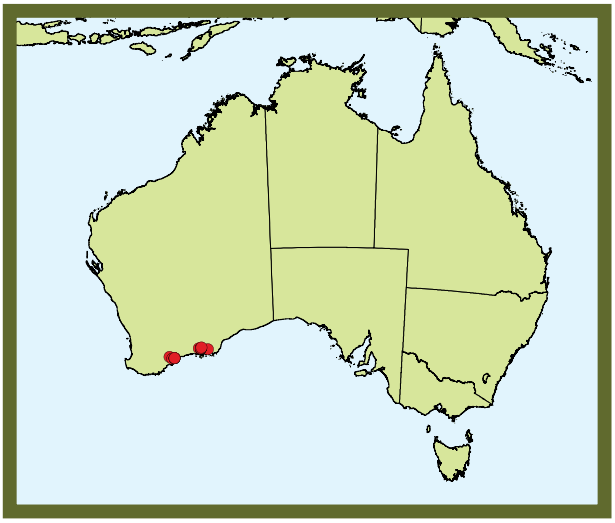
NATURAL OCCURRENCE: Western Australia: the Fitzgerald River and Wittenoom Hills districts.

ECOLOGY: Recorded as occurring in *Melaleuca* shrubland, open mallee, on granite, laterite, and near salt lakes.

FLOWERING TIME: Recorded as flowering from September to January.

ESSENTIAL OILS: The leaf oil of this species contained mainly sesquiterpenes. The principal sesquiterpenes present were α-cadinol (13–20%), T-muurolol (5–8%), δ-cadinol (2–3%), T-cadinol (4–7%) and δ-cadinene (10–13%). There were lesser amounts of β-caryophyllene (2–5%), allo-aromadendrene (1–2%) and α-humulene (1–3%). The main monoterpene was α-pinene (14–18%). No other monoterpene accounted for more than 0.5% of the total oil.

OIL YIELD: The oil yield (fresh weight, w/w) was 0.8–1.0%.



Melaleuca ***globifera*** R.Br.

PUBLICATION: in Aiton, *Hortus Kewensis, ed. 2,* 4: 411 (1812)

DERIVATION: *globifera*, from the Latin *globus*, and *-fer*, carrying, in reference to the spherical infructescences

DESCRIPTION: *Shrub* 1–6 m tall; bark papery. *Branchlets* glabrescent, sericeous (occasionally also with some sericeous-pubescent hairs). *Leaves* alternate, 36–66 mm long, 7–20.5 mm wide, 2.8–6.5 times as long as wide, long- to short-petiolate; blade glabrescent, sericeous (occasionally with some sericeous-pubescent hairs in the proximal part of the blade and petiole), narrowly obovate, narrowly elliptic, very narrowly obovate or very narrowly elliptic, in transverse section transversely linear, the base attenuate, the apex obtusely shortly acuminate, acuminate, acute or obtuse, the veins longitudinal, 7–11, *oil glands* dense or moderately dense, obscure, scattered to more or less in rows. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 12–20 triads, up to 30 mm wide. *Hypanthium* usually glabrous (sometimes glabrescent), 2.5–3.2 mm long. *Calyx lobes* abaxially glabrous or glabrescent, 0.4–1 mm long, usually scarious throughout or rarely scarious in a marginal band 0.3 mm wide. *Petals* deciduous, 1.7–2.5 mm long. *Stamens* 7–10 per bundle; filaments cream, white or light yellow, 7.5–10.5 mm long, the bundle claw (1.6–)2–3(–3.7) mm long, 0.2–0.6 times as long as the filaments. *Style* 11–11.5 mm long. *Ovules* c. 5–10 per locule. *Infructescences* globose. *Fruit* 3–5 mm long, the calyx lobes weathering away (rarely the proximal portion may persist, becoming more or less immersed in the hypanthium wall); cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Cape Le Grand – Duke of Orleans Bay district and the islands of the Archipelago of the Recherche.

ECOLOGY: Recorded as occurring in heath, mixed mallee shrubland, on granitic sand, and granite.

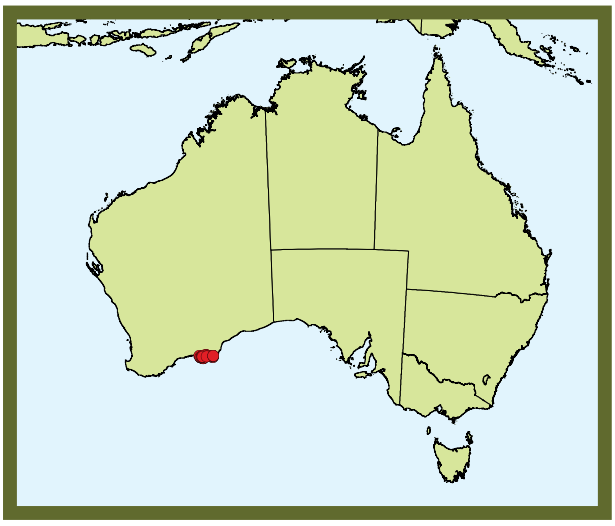
FLOWERING TIME: Recorded as flowering from June to December.

ESSENTIAL OILS: The leaf oil of this species contained significant amounts of monoterpenes, the principal members of which were 1,8-cineole (34–44%) and α-pinene (1–22%). These were accompanied by lesser amounts of limonene (1–4%), β-pinene (0.4–2.0%) and terpinen-4-ol (2–9%). The principal sesquiterpenes identified in the oil were globulol (2–6%), β-caryophyllene (0.2–5.0%), bicyclogermacrene (2–6%), E,E-farnesol (1–4%) and δ-cadinene (0.9–2.0%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.7–0.9%.

REFERENCE ON ESSENTIAL OILS: Brophy et al. 1990

NOTES: This species may be suitable for planting in temperate coastal areas, even those that receive salt spray as it can often be found growing close to the shoreline.



Melaleuca glomerata F.Muell.

PUBLICATION: *Report on the plants collected during Mr Babbage's expedition into the north-western interior of South Australia in 1858* 10 (1859)

DERIVATION: *glomerata*, from the Latin *glomeratus*, collected closely together into a head, in reference to the fruit of this species being closely clustered together, often into a subglobose head

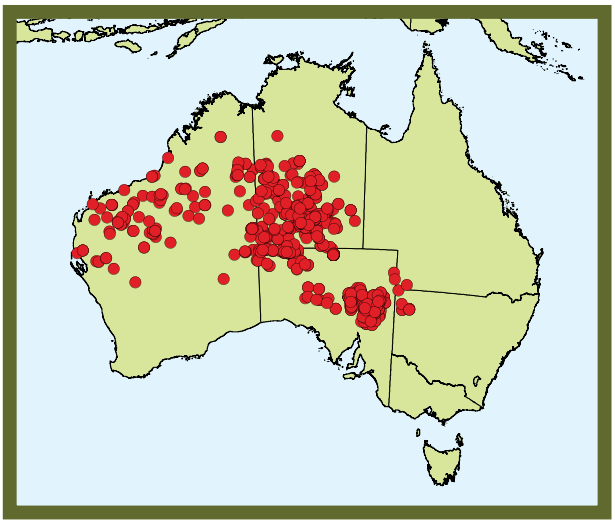
DESCRIPTION: *Tree or shrub* 0.3–12 m tall; bark papery, white, pale cream or grey. *Branchlets* glabrescent, puberulous to pubescent or sometimes sericeous or sericeous-pubescent. *Leaves* alternate, 11.5–78 mm long, 1–6.5 mm wide, 5–70 times as long as wide, subsessile to short-petiolate; blade glabrescent, puberulous to pubescent to sericeous or more or less sericeous-pubescent, rarely lanuginulose to lanuginulose-puberulous overlaid with longer, sericeous-pubescent to pubescent hairs, very narrowly obovate, linear-obovate, linear or linear-elliptic, in transverse section transversely narrowly elliptic or transversely linear, the base narrowly cuneate, the apex acuminate, narrowly acuminate or narrowly acute, the veins longitudinal, 3, *oil glands* dense or moderately dense, obscure to distinct, scattered. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 4–13 triads, up to 15 mm wide. *Hypanthium* hairy, 0.8–1.5 mm long. *Calyx lobes* abaxially hairy, 0.2–0.3(–0.7) mm long, weakly herbaceous (subscarious). *Petals* deciduous, 1.3–2 mm long. *Stamens* 4–13 per bundle; filaments pale yellow to white, 4–6.5 mm long, the bundle claw 1–2 mm long, 0.2–0.5 times as long as the filaments. *Style* 4–6.5 mm long. *Ovules* 10–15 per locule. *Infructescences* peg-fruited, approaching globose when fruit are numerous. *Fruit* 1.5–2.5 mm long, the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia, Northern Territory, South Australia, Queensland, New South Wales: widespread in the arid zone of Western Australia, Northern Territory and South Australia; in Queensland and New South Wales in the far south-west and far north-west, respectively.

ECOLOGY: Recorded as occurring in fringing woodland along freshwater and saline watercourses and around clay pans, open eucalypt shrubland, spinifex grassland, on sand, sand over limestone, alluvial soil, gravelly sand, sandstone gorges, sand over cracking clay, calcareous soils, and rock crevices.

FLOWERING TIME: Recorded as flowering from April to January.

ESSENTIAL OILS: The leaf oil obtained from this species contained significant amounts of both mono- and sesquiterpenes. The principal monoterpenes identified were 1,8-cineole (32–52%), limonene (1–5%) and α-terpineol (1–10%). Sesquiterpenes encountered included globulol (3–5%), γ-eudesmol (10–25%), α-eudesmol (7–21%)



and β-eudesmol (9–30%). The collection containing the greatest amount of sesquiterpenes contained very small amounts of monoterpenes.

OIL YIELD: The oil yield (dry weight, w/w) was <0.1%.

NOTES: *Melaleuca glomerata* is highly variable in its leaf morphology but the variation does not appear to be correlated with geography and/or climate or edaphic features to the point that an infraspecific taxonomy would be justified. This species should be more widely grown in temperate regions, both dry and semi-humid, as it occurs on a wide range of soil types. It could well be that selected forms will prove to be adaptable for use in shelter belts etc. and in domestic gardens. Although the individual inflorescences are not particularly attractive, a plant in full flower can be very pleasing to the eye.

Melaleuca ***gnidioides*** Brongn. & Gris

PUBLICATION: *Annales des sciences naturelles. Botanique. Paris. sér. 5*, 2: 139 (1864)

DERIVATION: *gnidioides*, from *Gnidia*, a genus of Thymelaeaceae, and the Greek *-oides*, resembling, in reference to a perceived similarity between this species and a species of *Gnidia*

DESCRIPTION: *Shrub* to 1.5 m tall. *Branchlets* glabrous to glabrescent. *Leaves* 10–16 mm long, 7–12 mm wide, short-petiolate; blade glabrescent, pubescent, narrowly elliptic, the base attenuate, the apex acute, the veins longitudinal, 5–7. *Inflorescences* subspheroidal, pseudoterminal. *Hypanthium* 2 mm long. *Calyx lobes* ciliate, 1.9–2.3 mm long. **Petals** 2.2–2.6 mm long. *Stamens* 4–9 per bundle; filaments white, ageing to pink, 8.5–12 mm long. *Style* 10–11 mm long. *Fruit* 2–3 mm long.

NATURAL OCCURRENCE: New Caledonia: the southern part of Grande Terre.

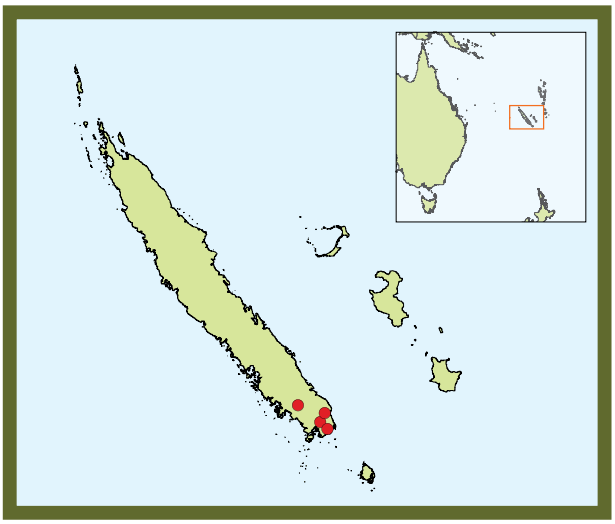
ECOLOGY: Recorded as occurring in maquis in depressions or riparian situations on eroded or hard soils on ultramafic substrates.

FLOWERING TIME: Recorded as flowering throughout the year, often from November to February.

ESSENTIAL OILS: The leaf oil of this species contained a preponderance of monoterpenes. The principal components were α-pinene (23.6%), β-pinene (13.6%) and limonene (9.8%). These were accompanied by lesser amounts of linalool (2.8%) and α-terpineol (4.4%). The principal sesquiterpenes identified were spathulenol (14.7%), globulol (2.3%), calamenene (2.8%), α-cadinol (1.8%) and T-cadinol (1.3%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.3%.

REFERENCE ON ESSENTIAL OILS: Hnawia et al. 2012



Melaleuca grieveana Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 879 (1999)

DERIVATION: *grieveana*, in honour of Brian John Grieve (1907–1997) whose work on identification manuals for southern Western Australian plants has been of great benefit to the scientific and general communities

DESCRIPTION: *Shrub* to 1.2 m tall. *Branchlets* glabrescent to hairy, pubescent to lanuginose–pubescent (often with some lanuginose to lanuginulose hairs). *Leaves* alternate, 5–19.5 mm long, 0.8–1.6 mm wide, 6.5–15 times as long as wide, short-petiolate to subsessile; blade hairy to glabrescent, pubescent to sericeous-pubescent (often with some lanuginose-pubescent hairs), very narrowly obovate or linear-obovate, in transverse section flattened transversely semielliptic, transversely semielliptic to semicircular or rarely transversely elliptic or quadrate, the base parallel (blade width equals petiole width) or attenuate, the apex acuminate or acute to obtuse, the veins longitudinal, 3, *oil glands* moderately dense, distinct, more or less in rows. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 4–8 triads, up to 14 mm wide. *Hypanthium* hairy, 0.5–1.5 mm long. *Calyx lobes* abaxially glabrous, 0.2–0.4 mm long, scarious throughout. *Petals* deciduous, 1.4–1.6 mm long. *Stamens* 3–6 per bundle; filaments creamy white, 4.3–6(–7) mm long, the bundle claw 1.5–2.8(–4) mm long, 0.4–0.6 times as long as the filaments. *Style* 6 mm long. *Ovules* c. 20–25 per locule. *Infructescences* globose. *Fruit* 2–2.5 mm long, the calyx lobes weathering away; cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: the Cowcowing Lakes – Narembeen – Parker Range district.

ECOLOGY: Recorded as occurring in sand-plain vegetation, open mallee – open heath community, mallee shrubland, on loamy clay soil, laterite-derived sandy loams, and brown sand over clay.

FLOWERING TIME: Recorded as flowering in September and October.

ESSENTIAL OILS: This species presented a leaf oil that was overwhelmingly monoterpenoid in character. The principal monoterpene was 1,8-cineole (79.4%). This was accompanied by lesser amounts of α-pinene (2.6%), myrcene (1.6%), limonene (3.2%), terpinen-4-ol (1.2%) and α-terpineol (6.2%). Sesquiterpenes contributed less than 5% to the oil, with the major members being spathulenol (0.5%) and globulol (0.3%).

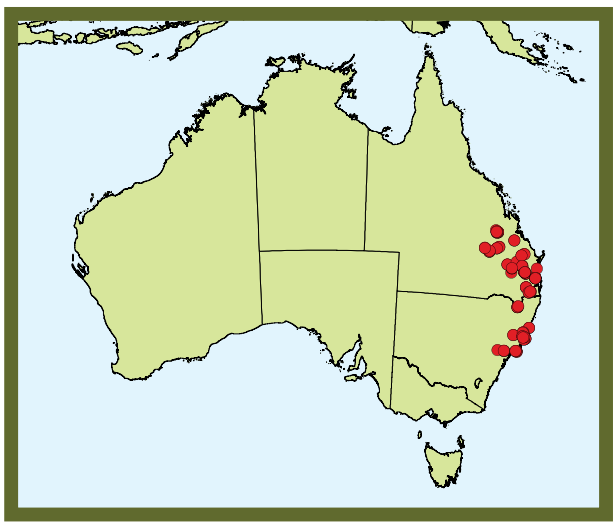
OIL YIELD: The oil yield (fresh weight, w/w) was 2.0%.

Melaleuca groveana Cheel & C.T.White

PUBLICATION: *Proceedings of the Royal Society of Queensland* 36: 41, fig. 1 (1924)

DERIVATION: *groveana*, in honour of C.H. Grove, a Queensland clergyman and the collector of the type specimen

DESCRIPTION: *Shrub* 1.5–5 m tall; bark papery to hard-flaky, whitish or pale yellowish-grey. *Branchlets* glabrescent, pubescent with some shorter lanuginose-pubescent and lanuginulose hairs also. *Leaves* alternate, 10–55 mm long, 3–10 mm wide, 2.3–11 times as long as wide, short- to long-petiolate; blade glabrescent, sericeous-pubescent to sericeous, sometimes with pubescent hairs also towards the base and rarely with some lanuginose-pubescent or lanuginulose hairs also, narrowly elliptic, very narrowly elliptic, narrowly obovate, narrowly ovate, elliptic or obovate, in transverse section transversely linear, the base cuneate or attenuate, the apex acuminate or narrowly acute, the veins pinnate to longitudinal-pinnate, 5–15 when pinnate and 5–7 when longitudinal, *oil glands* dense, distinct or obscure, scattered. *Inflorescences* spicate, pseudoterminal and sometimes also upper axillary, with 3–16 monads, up to 35 mm wide. *Hypanthium* glabrous, 2.5–3.7 mm long. *Calyx lobes* abaxially glabrous, 1–1.7 mm long, scarious in a marginal band 0.2–0.5 mm wide. *Petals* deciduous, 3.5–3.8 mm long. *Stamens* 11–26 per bundle; filaments white, 9–10.5 mm long, the bundle claw 1.5–3.5 mm long, 0.1–0.4 times as long as the filaments. *Style* 10–16.5 mm long. *Ovules* c. 110–135 per locule. *Fruit* 3.5–7 mm long, the calyx lobes soon weathering away; cotyledons obvolute.



NATURAL OCCURRENCE: New South Wales, Queensland: from the Bluff district in Queensland, south to the Port Stephens district in New South Wales.

ECOLOGY: Recorded as occurring in shrubland, heathland, mixed low forest, monsoonal forest, on rocky cliff top, sandstone, loam, and volcanics.

FLOWERING TIME: Recorded as flowering from August to October.

ESSENTIAL OILS: This species gave a monoterpenoid oil, though there was variation within that. Collection BJL 1488 gave as its major components α-pinene (23–32%), α-phellandrene (8–23%), p-cymene (16–34%), terpinen-4-ol (3–7%) and α-terpineol (3–8%). Collection BJL 1196 gave α-pinene (54–60%), 1,8-cineole (25–28%), limonene (2–3%) and α-terpineol (6–10%) as principal components.

OIL YIELD: The oil yields (fresh weight, w/w) were trace–0.2% for BJL 1488 and 0.5–0.8% for BJL 1196.

Melaleuca ***halmaturorum*** F.Muell. ex Miq.

PUBLICATION: *Nederlandsch Kruidkundig Archief* 4: 122 (1856)

DERIVATION: *halmaturorum*, from *Halmaturus*, a genus of Macropodidae, hence *insulae Halmaturorum*, Kangaroo Island, in reference to the type material of this species having been collected on this island

SYNONYMS: *Melaleuca cymbifolia* Benth.; *Melaleuca halmaturorum* subsp. *cymbifolia* (Benth.) Barlow

DESCRIPTION: *Tree or shrub* 1.5–7 m tall; bark papery to hard-fibrous, white to creamy-grey. *Branchlets* glabrescent, lanuginulose to lanuginulose-puberulous and rarely also with some scattered puberulous or sericeous-lanuginulose hairs. *Leaves* decussate, 2.6–9 mm long, 0.7–1.8 mm wide, 2–6 times as long as wide, short-petiolate to subsessile; blade glabrescent, lanuginulose to lanuginulose-puberulous and rarely with some puberulous or sericeous-lanuginulose hairs also, narrowly elliptic, very narrowly elliptic, rarely narrowly ovate or narrowly obovate, in transverse section flattened transversely semielliptic or rarely shallowly lunate, the base attenuate, the apex acute or obtuse to rarely rounded, the veins longitudinal, 3, *oil glands* moderately dense, obscure to distinct, in rows. *Inflorescences* capitate or subcapitate, pseudoterminal and sometimes also upper axillary, with 1–5 monads, up to 15 mm wide. *Hypanthium* glabrous or rarely hairy, 1.5–2.5 mm long. *Calyx lobes* abaxially glabrous or glabrescent, 1–2 mm long, herbaceous to the margin or scarious in a marginal band up to 0.2 mm wide. *Petals* deciduous, 2–4 mm long. *Stamens* 6–17(–22) per bundle; filaments white or cream, 4–7.5 mm long, the bundle claw 1–2.5(–3.5) mm long, 0.4–0.5 times as long as the filaments. *Style* 5–7.6 mm long. *Ovules* 40–65 per locule. *Fruit* 3–5.5 mm long, the calyx lobes persistent or weathering away (generally persistent to the mature fruit stage more or less unchanged, but the distal c. 3/4 eventually weathering off, leaving the woody basal c. 1/4 as undulations or very blunt teeth); cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia, South Australia, Victoria: southern Western Australia and the Eyre Peninsula region of South Australia eastwards to western Victoria.

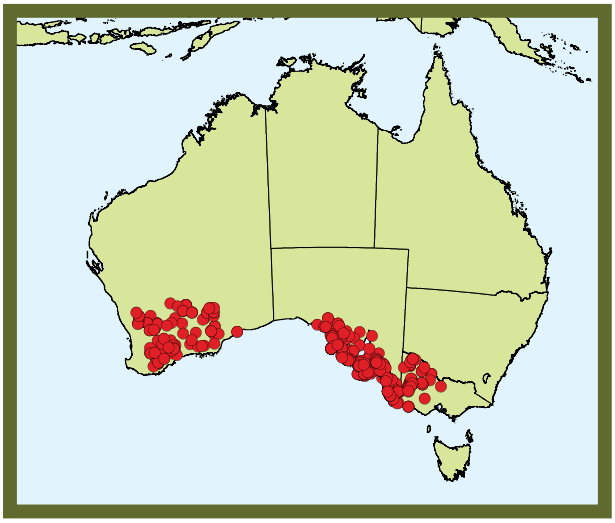
ECOLOGY: Recorded as occurring in tall mallee – *Melaleuca* thicket, open woodland, margins of fresh and salt lakes/swamps, dune remnants, along drainage lines, on sandy soil, clayey sand, gravelly sand, and disturbed gypsum.

FLOWERING TIME: Recorded as flowering in March and from August to December.

ESSENTIAL OILS: This species contained significant amounts of monoterpenes and acyl-phloroglucinol derivatives. The principal monoterpenes encountered were α-pinene (12.9%) and 1,8-cineole (11.9%). These were accompanied by lesser amounts of β-pinene (2.4%), limonene (3.2%), terpinen-4-ol (0.4%) and α-terpineol (1.0%). The principal sesquiterpenes in the oil were bicyclogermacrene (3.8%), δ-cadinene (1.8%), globulol (2.7%), viridiflorol (1.3%) and spathulenol (6.7%). The oil contained three aromatic compounds, which are thought to be 2-hydroxy-4,6-dimethoxy-1-isoutyrophenone (26.8%), 2,4,6-trimethoxy-1-isobutyrophenone (1.2%) and 2-hydroxy-4,6-dimethoxy-(3 or 5)-methyl-1-isovalerophenone (2.3%).

OIL YIELD: The oil yield (fresh weight, w/w) was <0.1%.

NOTES: *Melaleuca halmaturorum* is a species well suited for growing in saline soils and can be used in land rehabilitation projects and for shelter belts etc., especially in saline country.



Melaleuca halophila Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 880 (1999)

DERIVATION: *halophila*, from the Greek *halos*, salt, and *phileo*, love, in reference to the apparently saline soils on which this species occurs

DESCRIPTION: *Shrub* to 3 m tall. *Branchlets* glabrescent, sericeous. *Leaves* alternate, 11–30.5 mm long, 1.7–2.5 mm wide, 6.5–13 times as long as wide, subsessile to very rarely short-petiolate; blade glabrescent, sericeous (often becoming sericeous-lanuginulose or rarely lanuginulose distally), linear-elliptic to very narrowly elliptic, in transverse section transversely elliptic, the base attenuate, the apex shortly acuminate, the veins longitudinal, 3(–5), *oil glands* dense, obscure, more or less in rows. *Inflorescences* capitate, pseudoterminal or upper axillary, with 5–11 triads, up to 15 mm wide. *Hypanthium* hairy, 1.2–1.6 mm long. *Calyx lobes* abaxially glabrous, 0.3–0.5 mm long, scarious throughout. *Petals* deciduous, 1–1.5 mm long. *Stamens* 3–7 per bundle; filaments white, 3.5–6 mm long, the bundle claw 0.2–1.8 mm long, 0.04–0.3 times as long as the filaments. *Style* 6–7.5 mm long. *Ovules* c. 30–35 per locule. *Infructescences* globose. *Fruit* 1.8–3 mm long, the calyx lobes weathering away; cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: the Fitzgerald Peaks – Salmon Gums district.

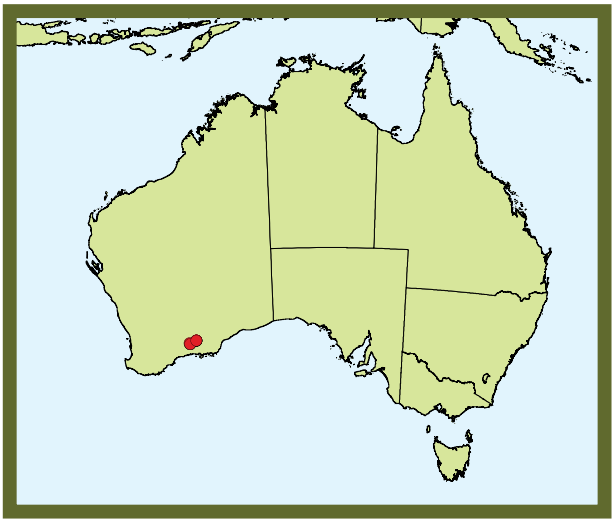
ECOLOGY: Recorded as occurring in shrub mallee, open dwarf scrub, *Melaleuca* thicket, *Acacia–Melaleuca*–samphire community, on clay pan fringe, undulating sandhills on edge of salt lake, saline sandy loam along saline creek, and on white sand at edge of small salt lake.

FLOWERING TIME: Recorded as flowering in October and November.

ESSENTIAL OILS: This species existed in two chemotypes, one of which was rich in 1,8-cineole and the second rich in terpinen-4-ol. Chemotype I contained 1,8-cineole (25–43%) as its principal component, with lesser amounts of α-pinene (12–14%), myrcene (3–5%), α-terpinene (2–4%), limonene (3–4%), γ-terpinene (5–7%), terpinen-4-ol (12–16%) and α-terpineol (4–6%). Chemotype II contained terpinen-4-ol (43.9%) as its principal component, with lesser amounts of α-pinene (7.9%), myrcene (5.3%), α-terpinene (6.4%), γ-terpinene (9.6%), p-cymene (6.3%) and α-terpineol (3.0%). This was from a bulk sample of three trees. This chemotype would make an ideal commercial source of terpinen-4-ol rich oil with similarities to commercial tea tree oil.

OIL YIELD: The oil yield (fresh weight, w/w) was 1.0–1.3% for chemotype I and 1.7% for chemotype II.

NOTES: The terpinen-4-ol chemotype should be trialled as a source of terpinen-4-ol rich oil on salt-affected soils in temperate climates as it may both assist in land rehabilitation and provide a commercial product through harvesting for oil extraction. It may be possible to devise a rapid test for screening seedlings as the odour of terpinen-4-ol is very different to that of 1,8-cineole.



Melaleuca hamata Fielding & Gardner

PUBLICATION: *Sertum plantarum* t. 74 (1844)

DERIVATION: *hamata*, from the Latin *hamus*, hook, barb, in reference to the recurved apex of the leaves of this species

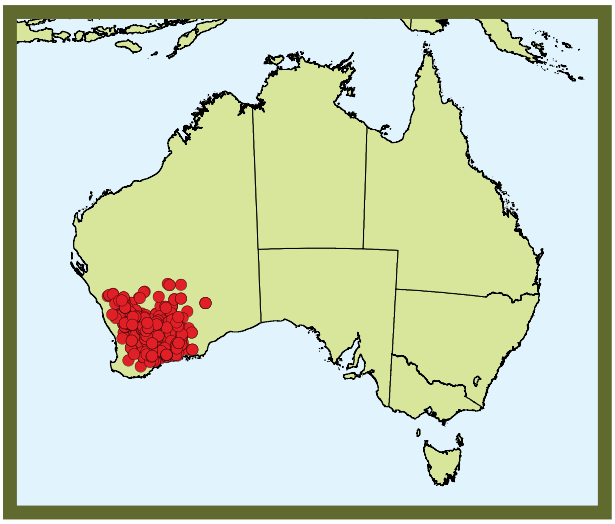
DESCRIPTION: *Shrub or tree* to 5 m tall; bark papery, peeling-flaking. *Branchlets* glabrescent, with sericeous or sericeous-pubescent to pubescent hairs. *Leaves* ascending or spreading-ascending, 20–82 mm long (usually 30–70), 0.8–1.6 mm wide, 20–82 times as long as wide (usually 30–60), petiole 0–1 mm long; blade glabrescent, sericeous or sericeous-pubescent to pubescent, linear, in transverse section subcircular, circular, transversely elliptic or depressed obovate, in lateral view straight or incurved, the base very narrowly cuneate or parallel, the apex narrowly acuminate, acuminate, narrowly acute or aristate, *oil glands* scattered. *Inflorescences* capitate, with 5–15 triads. *Hypanthium* 1–1.3 mm long, 1.1–1.8 mm wide. *Calyx lobes* 5, free, abaxially glabrous or rarely hairy, 0.2–0.5 mm long. *Petals* usually caducous or sometimes deciduous, broadly ovate, subcircular or very broadly ovate, 1–2 mm long, oil glands subcircular to circular, elliptic or frequently linear. *Stamens* 3–8 per bundle, the filaments creamy white, creamy yellow, whitish yellow, pale yellow or white, 4–9.1 mm long, the bundle claw 1.2–3.7 mm long, 0.3–0.4 times as long as the filaments. *Style* 6.5–11.5 mm long. *Ovules* 20–38 per locule. *Infructescences* longer than wide (occasionally as wide as long, very rarely shorter than wide), 6.5–12 mm wide, the constituent fruits closely packed and not retaining a significant separate identity (the fruiting hypanthia closely packed for their full length). Seeds 0.5–0.9 mm long, the cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: from the Mt Gibson – Lake Moore – Leinster district southwards to the Nyabing – Munglinup – Mt Ridley district.

ECOLOGY: Recorded as occurring in a wide range of habitats including mallee–*Melaleuca* scrub, *Acacia–Eremophila* scrub, open spinifex heath with *Callitris* and mallees, heath, dense shrubland, low mallee with *Melaleuca*, open eucalypt woodland, eucalypt woodland with heathy understorey, *Acacia–Melaleuca* scrub, on red brown clayey sand over granite, shallow red soil over granite, sandy loam on laterite, red brown clay, yellow brown sand over granite, gravelly sand, yellow sand, white sand over clay, yellow loam over clay, hard pale brown sandy loam, grey clay loam sand, brown loamy sand in broad saline drainage line, and red clay loam with ironstone gravel.

FLOWERING TIME: Recorded as flowering from September to January.

ESSENTIAL OILS: The leaf oils from this species indicated that it occurred in two chemotypes. Chemotype I contained 1,8-cineole (40–47%) and linalool (28–34%) as principal components. These were accompanied by lesser amounts of α-pinene (4–6%), limonene (1–3%),



hex-3-enyl butyrate (3–5%) and α-terpineol (2–4%). Chemotype II contained terpinen-4-ol (24–42%) and p-cymene (10–27%) as principal components and lesser amounts of γ-terpinene (1–16%), α-pinene (1–3%), sabinene (2–8%), α-terpinene (4–6%), limonene (1–3%) and α-thujene (1–2%). In both chemotypes, sesquiterpenes accounted for less than 10% of the oil in total.

OIL YIELD: The oil yields (fresh weight, w/w) were 0.6–1.0% for chemotype I and 0.7–2.0% for chemotype II.

REFERENCE ON ESSENTIAL OILS: Brophy et al. 2006b

NOTES: This is the most common broombush species in the Western Australian wheat belt. Being a sprouter, it could be worth trialling for brushwood production as the wide distribution and ecological amplitude offers the chance of discovering genotypes amenable to cultivation. One of the two chemotypes can be high in terpinen-4-ol and the species may be worth investigating further as a potential oil source. There may also be variation in the linalool chemotype that would lead to this chemotype also being of value.

Melaleuca ***hamulosa*** Turcz.

PUBLICATION: *Bulletin de la Société Impériale des Naturalistes de Moscou* 20: 165 (1847)

DERIVATION: *hamulosa*, from the Latin *hamus*, hook, barb, in reference to the recurved apex of the leaves of this species

DESCRIPTION: *Shrub or tree* 1–7 m tall; bark papery or fibrous. *Branchlets* soon glabrescent (the lanuginulose hairs ephemeral, rarely with some lanuginulose-puberulous hairs also). *Leaves* alternate, 3.5–11 mm long, 0.6–1 mm wide, 5–12 times as long as wide, short-petiolate to subsessile; blade soon glabrescent (the lanuginulose hairs ephemeral, occasionally with some lanuginulose-puberulous hairs also), linear, linear-elliptic or rarely linear-obovate, in transverse section depressed obovate, the base attenuate, the apex aristate or acuminate, 1-veined, *oil glands* moderately dense, obscure, in rows. *Inflorescences* spicate, interstitial, with 30–60 monads, up to 20 mm wide. *Hypanthium* glabrous, 1–1.5 mm long. *Calyx lobes* abaxially glabrous, 0.4–1 mm long, scarious in a marginal band 0.1–0.4 mm wide. *Petals* deciduous, 1.7–2.3 mm long. *Stamens* 8–16 per bundle; filaments mauve, pale purple, cream, or white or yellowish, 4.5–8 mm long, the bundle claw 2.8–4.5 mm long, 0.6 times as long as the filaments. *Style* 5–7.5 mm long. *Ovules* c. 50–80 per locule. *Fruit* 2–3 mm long, with sepaline teeth (the lobes persist to the mature fruit stage, the proximal c. 1/2 to 3/4 becoming woody and more or less immersed in the hypanthium wall, with the distal portion weathering away, leaving undulations or blunt teeth; cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: from the Eneabba district south to the Stirling Range and east to the Southern Cross and Ravensthorpe districts.

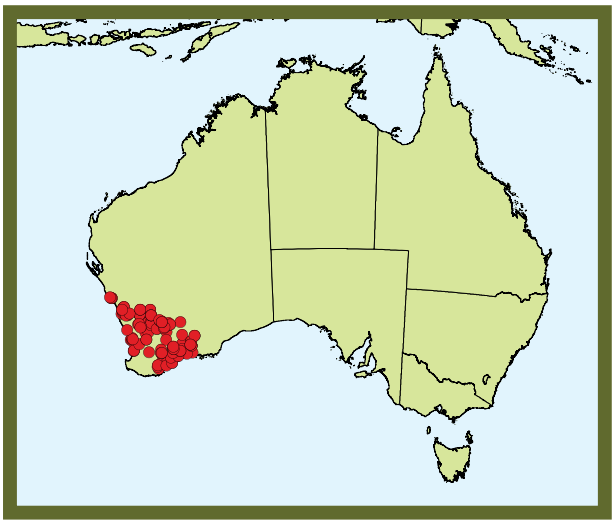
ECOLOGY: Recorded as occurring in heathy shrubland with mallee, tall closed shrubland, tall eucalypt woodland, along fresh or saline lake edges and river banks, on sand over clay, granite, laterite, and alluvium.

FLOWERING TIME: Recorded as flowering from September to February.

ESSENTIAL OILS: This species gave a predominantly sesquiterpenic oil. The principal components were bicyclogermacrene (21.3%), globulol (13.2%), spathulenol (7.5%), aromadendrene (2.2%), δ-cadinene (1.9%) and cubeban-11-ol (3.1%). The principal monoterpenes were α-pinene (4.4%) and myrcene (0.4%).

OIL YIELD: The oil yield (fresh weight, w/w) was <0.1%.

NOTES: The mauve- to purple-flowered forms of this species might provide horticulturists with a good alternative to the white-flowered *M. armillaris*. The two species are similar enough that *M. hamulosa* could be regarded as a replacement for the latter species in certain situations, especially where a white-flowered plant is not desirable.



Melaleuca ***haplantha*** Barlow

PUBLICATION: in Barlow & Cowley, *Australian Systematic Botany* 1: 105, fig. 6c–e (1988)

DERIVATION: *haplantha*, from the Greek *haplos*, single, and *anthos*, flower, in reference to the usually 1-flowered inflorescence

DESCRIPTION: *Shrub or tree* 1–2 m tall. *Branchlets* glabrescent, lanuginulose to lanuginulose-puberulous. *Leaves* decussate, 3.6–10.6 mm long, 0.7–2.2 mm wide, 4–7 times as long as wide, short-petiolate to subsessile; blade glabrescent, lanuginulose to lanuginulose-puberulous (crystalline fibres apparently associated with stomata also present), very narrowly elliptic, very narrowly ovate, rarely linear-elliptic or linear-ovate, in transverse section flattened transversely semielliptic, transversely semielliptic to semicircular or rarely subcircular, the base attenuate, the apex acuminate, obtusely shortly acuminate or acute, the veins longitudinal, 3, *oil glands* moderately dense, obscure, more or less in rows to scattered. *Inflorescences* subcapitate, pseudoterminal or terminal, with 1(–3) monads. *Hypanthium* glabrescent, 2–2.5 mm long. *Calyx lobes* abaxially glabrescent, 2–2.8 mm long, scarious in a marginal band 0.1–0.2 mm wide. *Petals* deciduous, 3–3.6 mm long. *Stamens* 17–24 per bundle; filaments white, cream or creamy-yellow, 5.5–8.5 mm long, the bundle claw 1.5–3.5 mm long, 0.4 times as long as the filaments. *Style* 6.8–9.5 mm long. *Ovules* 40–70 per locule. *Fruit* 4–5.5 mm long, the calyx lobes persistent to mature fruit with the basal c. 1/3 becoming woody and the distal c. 2/3 weathering away (the teeth eventually becoming more or less immersed in the hypanthium wall); cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: from the New Norcia district eastwards to the Mukinbudin district and south to the Stirling Range – Hopetoun district.

ECOLOGY: Recorded as occurring in tall dense mallee scrub with shrubby understorey, heath, open eucalypt woodland, on sandy clay, and sandy loam over laterite.

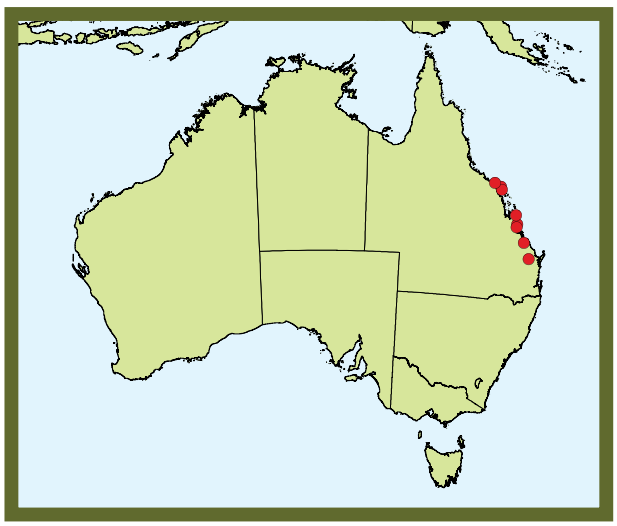
FLOWERING TIME: Recorded as flowering from July to October.

ESSENTIAL OILS: This species produced a leaf oil that was predominantly monoterpenoid in character, though there were substantial amounts of sesquiterpenes. The major monoterpenes present were α-pinene (20.9%) and 1,8-cineole (10.3%). These were accompanied by lesser amounts of β-pinene (2.7%), terpinen-4-ol (1.6%), α-terpineol (1.3%), myrtenal (5.3%) and geraniol (1.3%). The principal sesquiterpenes encountered were spathulenol (14.1%), globulol (4%), viridiflorol (4.1%), cubeban-11-ol (2.4%) and bicyclogermacrene (1.6%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.2%.

Melaleuca ***hemisticta*** S.T.Blake ex Craven

PUBLICATION: *Novon* 19: 444 (2009)
DERIVATION: *hemisticta*, from the Greek *hemi-*, half, and *stictos*, spotted, in reference to the leaf oil glands often being only within the basal half of the blade
SYNONYM: *Callistemon hemistictus* (S.T.Blake ex Craven) Udovicic & R.D.Spencer



DESCRIPTION: ***Shrub*** 1–6 m tall; bark papery or approaching fibrous, hard, grey. ***Branchlets*** glabrescent, sericeous-lanuginulose. ***Leaves*** alternate, 42–102 mm long, 6–28 mm wide, 3.5–11 times as long as wide, long- or short-petiolate; blade glabrescent, sericeous to sericeous-pubescent, narrowly elliptic, narrowly ovate, elliptic or rarely narrowly obovate, in transverse section transversely linear or obsublunate, the base attenuate to very narrowly attenuate, the apex acute or very shortly acuminate, the veins pinnate, 15–31, ***oil glands*** dense to sparse (often present in the proximal region only or along the midrib, when distributed throughout the blade, then more dense in the proximal region), distinct or obscure, scattered. ***Inflorescences*** spicate, pseudoterminal and sometimes also upper axillary or interstitial, with 10–50 monads, 30–45 mm wide. ***Hypanthium*** glabrescent, 2.9–3.9 mm long. ***Calyx lobes*** abaxially hairy (usually with cilia on the margin only), 1.2–1.6 mm long, scarious in a marginal band 0.4–0.5 mm wide or herbaceous to the margin. ***Petals*** deciduous, 3.4–5.4 mm long. ***Stamens*** 35–53 per flower; filaments red or reddish-pink, 16–17 mm long; anthers yellow. ***Style*** 17–24 mm long.

Ovules c. 100–200 per locule. *Fruit* 4–5.2 mm long, the calyx lobes deciduous; cotyledons obvolute.

NATURAL OCCURRENCE: Queensland: the Bowen–Bundaberg district and adjacent islands.

ECOLOGY: Recorded as occurring in shrubland, rainforest margins, shrubby low open forest, edge of riverine rainforest, *Lophostemon* scrub, cliff tops, creek bed with small boulders, rocky hillside beside creek above mangrove, shrub community at base of rock face, windswept heathland, on rhyolite, granite, trachyte, and brown stony soil.

FLOWERING TIME: Recorded as flowering from March to September.

ESSENTIAL OILS: This species produced a monoterpenoid oil. The principal component was 1,8-cineole (54–70%). This was accompanied by lesser amounts of α-pinene (trace–3%), limonene (5–6%), p-cymene (5–7%) and α-terpineol (4–8%). Sesquiterpenes accounted for less than 10% of the oil, with caryophyllene oxide (0.5–1.0%), spathulenol (0.8–2.0%) and β-caryophyllene (0.6–2.0%) being the principal components.

OIL YIELD: The oil yield (fresh weight, w/w) was <0.1%.

REFERENCE ON ESSENTIAL OILS: Brophy et al. 1998, as *Callistemon* sp. Mt Wheeler, *Callistemon* sp. Mt Walsh

NOTES: This attractive bottlebrush needs to be evaluated as an ornamental shrub in subtropical environments.

Melaleuca ***hnatiukii*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 880 (1999)

DERIVATION: *hnatiukii*, in honour of Roger James Hnatiuk (1946–), phytographer and student of *Eremaea* (Myrtaceae) and *Melaleuca*

DESCRIPTION: *Shrub* 0.6–2.5 m tall; bark papery, dirty white. *Branchlets* glabrescent, pubescent to sericeous-pubescent. *Leaves* alternate, 12–24 mm long, 4–8 mm wide, 2.7–5.5 times as long as wide, short-petiolate; blade glabrescent, pubescent to sericeous-pubescent with some lanuginose-pubescent hairs distally, narrowly elliptic to elliptic or rarely narrowly obovate, in transverse section transversely linear, the base attenuate to cuneate, the apex acuminate, the veins longitudinal, 5–7, *oil glands* moderately dense, distinct to obscure, more or less in rows.

Inflorescences capitate or shortly spicate, pseudoterminal and sometimes also upper axillary, with 2–12 triads, up to 23 mm wide. *Hypanthium* subglabrous (a few pubescent hairs may be present at the very base of the hypanthium), 1.5–2 mm long. *Calyx lobes* abaxially glabrous, 0.4–0.7 mm long, scarious throughout. *Petals* deciduous, 2–3 mm long. *Stamens* 5–8 per bundle; filaments cream, 7–10.5 mm long, the bundle claw 1.3–2.7(–4.8) mm long, 0.2–0.5 times as long as the filaments. *Style* 8–9 mm long. *Ovules* 10–25 per locule. *Infructescences* globose. *Fruit* (2.5–)3–4 mm long, the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Scaddan district.

ECOLOGY: Recorded as occurring in *Melaleuca* shrubland, open shrub mallee, and on sand near salt lakes.

FLOWERING TIME: Recorded as flowering from September to January.

ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal component was 1,8-cineole (64–68%). This was accompanied by lesser amounts of α-pinene (4–11%), limonene (4–6%), β-pinene (1–6%), methyl geranate (2–7%) and myrtenal (1–5%). Sesquiterpenes, though numerous, did not contribute much to the oil, with the principal components being globulol (0.3–0.7%), spathulenol (0.3–0.6%) and bicyclogermacrene (0.2–0.8%).

OIL YIELD: The oil yield (fresh weight, w/w) was 1.2–1.7%.

NOTES: *Melaleuca hnatiukii* should be trialled in revegetation projects in areas with a dry Mediterranean climate as one of the smaller shrub components.

Melaleuca ***hollidayi*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 881 (1999)

DERIVATION: *hollidayi*, in honour of Ivan Grenfell Holliday (1926–2010), of Adelaide, South Australia, who did much to promote interest in the cultivation of Australian plants, especially melaleucas, through his several books

DESCRIPTION: *Shrub* 0.4–1.3 m tall; bark peeling. *Branchlets* glabrescent, usually lanuginose (rarely lanuginulose) to lanuginose-pubescent and lanuginose-sericeous, with longer sericeous to sericeous-pubescent hairs also. *Leaves* alternate, 5–12 mm long, 0.5–0.8 mm wide, 9–17 times as long as wide, subsessile to sessile; blade glabrescent, on the abaxial surface especially, usually sericeous to lanuginose-sericeous or sericeous-pubescent, rarely lanuginose-pubescent or lanuginose also (on the adaxial surface generally with sparser long pubescent hairs), linear, in transverse section depressed obovate or transversely elliptic to subcircular, the base truncate, the apex obtuse to rounded (rarely approaching acute), the veins longitudinal, 3, *oil glands* moderately dense, distinct, scattered to more or less in rows. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 2–9 triads, up to 22 mm wide. *Hypanthium* hairy, 1.5–1.8 mm long. *Calyx lobes* abaxially glabrous or rarely glabrescent to hairy, 0.7–1.4 mm long, scarious throughout. *Petals* caducous, 1.5–2.6 mm long. *Stamens* 5–10 per bundle; filaments pink, bright deep pink, rose-pink, mauve, purple or pinkish-mauve, 7.3–11 mm long, the bundle claw 1.8–3.5(–5) mm long, 0.2–0.5 times as long as the filaments. *Style* 10.5–14.5 mm long. *Ovules* 15–20 per locule. *Infructescences* peg-fruited. *Fruit* 3–4 mm long, the calyx lobes weathering away; cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: from the Kalbarri–Mullewa district south to the Northampton–Moora district.

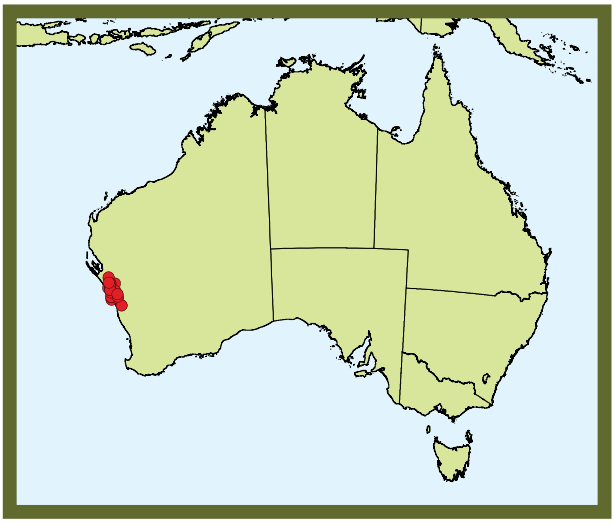
ECOLOGY: Recorded as occurring in heath with *Banksia*, sand plain, on sand, and yellow sandy loam over laterite.

FLOWERING TIME: Recorded as flowering from August to November.

ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal monoterpene was α-pinene (56.3%) and this was accompanied by lesser amounts of β-pinene (8.8%), 1,8-cineole (7.0%), limonene (1.1%) and α-terpineol (2.5%). The principal sesquiterpenes were globulol (4.0%), viridiflorol (2.2%), spathulenol (3.6%) and bicyclogermacrene (2.6%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.2%.

NOTES: This member of the *M. scabra* group has been cultivated successfully in Adelaide, South Australia (Holliday 2004), and it warrants trialling more broadly as a small ornamental shrub in regions with a dry Mediterranean climate.



Melaleuca ***holosericea*** Schauer

PUBLICATION: in Lehmann, *Plantae Preissianae* 1: 139 (1844)

DERIVATION: *holosericea*, from the Greek *holo-*, entire, complete, whole, and *serikon*, silk, in reference to the persistent, often silky indumentum of the foliage and branchlets

DESCRIPTION: *Shrub* 0.2–0.6 m tall. *Branchlets* hairy, pubescent or more or less sericeous to minutely sericeous and rarely more or less sericeous-lanuginulose, usually with scattered, much longer pubescent hairs overlying these. *Leaves* alternate, 6–13 mm long, 0.5–1 mm wide, 10–20 times as long as wide, sessile to subsessile; blade hairy to glabrescent, usually more or less sericeous to lanuginose-sericeous and/or sericeous-lanuginulose grading to sericeous-pubescent and often with some sparser, long pubescent hairs also, linear to linear-obovate, in transverse section transversely elliptic to subcircular, depressed obovate or transversely semielliptic, the base truncate or parallel (blade width equals petiole width), the apex obtuse to acute or rarely narrowly acute or approaching shortly acuminate, the veins longitudinal, 3, *oil glands* moderately dense, distinct to obscure, scattered. *Inflorescences* capitate, pseudoterminal, with 2–5 triads, up to 16 mm wide. *Hypanthium* hairy, 1.5–2 mm long. *Calyx lobes* abaxially hairy or rarely glabrescent, 0.5–1.2 mm long, scarious throughout. *Petals* caducous, 1.5–3 mm long. *Stamens* 7–9 per bundle; filaments pink or cerise, 7–8.5 mm long, the bundle claw 2.3–4.2 mm long, 0.3–0.5 times as long as the filaments. *Style* 10–10.5 mm long. *Ovules* 15–25 per locule. *Infructescences* peg-fruited (rarely approaching globose). *Fruit* 3–4.5 mm long, the calyx lobes usually weathering away or sometimes replaced by weakly developed sepaline teeth that form a series of indistinct undulations around the rim; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Clackline–Toodyay–Northam district.

ECOLOGY: Recorded as occurring in low open heath with emergent eucalypts, open scrubland, on sand over laterite, sand over clay, laterite, and clay.

FLOWERING TIME: Recorded as flowering in September and October.

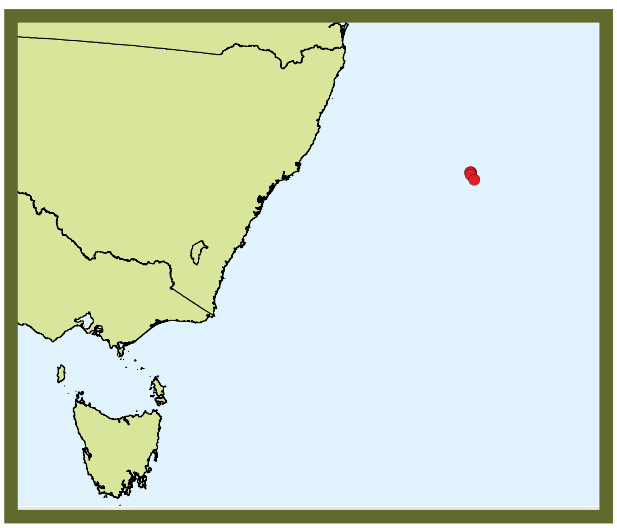
ESSENTIAL OILS: The leaf oil of this species contained roughly equal amounts of both mono- and sesquiterpenes. The principal monoterpenes encountered were 1,8-cineole (31.9%), α-pinene (4.1%), limonene (2.5%), Z-β-ocimene (1.2%) and α-terpineol (5%). The principal sesquiterpenes were γ-, α- and β-eudesmol (8.7%, 8.4% and 11.4%, respectively), globulol (3.8%) and viridiflorol (2.2%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.5%.

NOTES: The name *M. holosericea* has been widely misapplied to pinkish mauve-flowered species of the *M. scabra* group. *Melaleuca holosericea* is a species that has a relatively restricted geographical range as noted above.

Melaleuca howeana Cheel

PUBLICATION: *Journal and Proceedings of the Royal Society of New South Wales* 58: 192 (1924)
DERIVATION: *howeana*, from the locality Lord Howe Island
DESCRIPTION: *Shrub* up to 3(–4) m tall. *Branchlets* glabrescent, lanuginulose-puberulous, occasionally some puberulous or lanuginulose hairs also present. *Leaves* alternate (ternate or subternate occur rarely), 3.3–9 mm long, 1–1.6 mm wide, 2.5–4.5 times as long as wide, short-petiolate to subsessile; blade glabrescent, the ephemeral indumentum of lanuginulose-puberulous to lanuginulose hairs, rarely a few puberulous hairs also present, very narrowly elliptic, linear-elliptic or narrowly elliptic, in transverse section transversely semielliptic, transversely elliptic or depressed obovate, the base attenuate or narrowly cuneate, the apex obtuse to acute, the veins longitudinal, 3, *oil glands* obscure, scattered. *Inflorescences* spicate, pseudoterminal, with 6–18 monads, up to 20 mm wide. *Hypanthium* glabrous (rarely some puberulous hairs may be present in the proximal portion), 2–3 mm long. *Calyx lobes* glabrous, 0.5–1 mm long, herbaceous to (or almost to) the margin. *Petals* deciduous, 1.5–2 mm long. *Stamens* 6–12 per bundle; filaments white; 3.5–6 mm long, the bundle claw 1–1.8 mm long, 0.2–0.4 times as long as the filaments. *Style* 5–8.5 mm long. *Ovules* 30–60 per locule. *Fruit* 3–4 mm long, cylindrical to cup-shaped, the calyx lobes replaced by sepaline teeth; cotyledons subobvolute (almost planoconvex).



NATURAL OCCURRENCE: Lord Howe Island, including nearby Balls Pyramid.
ECOLOGY: Apparently occurring in exposed situations from the shore line to ridges and cliffs.
FLOWERING TIME: Recorded as flowering mainly from September to December.
ESSENTIAL OILS: The leaf oil of this species presented a variable but predominantly sesquiterpenic oil. The main sesquiterpenes encountered were globulol (8–19%), viridiflorol (1–7%), spathulenol (2–6%), cubeban-11-ol (3–7%), β-caryophyllene (5–6%), aromadendrene (3–6%) and bicyclogermacrene (1–4%). The main monoterpenes detected in the oil were limonene (1–7%), 1,8-cineole (5–40%) and α-terpineol (5–8%).
OIL YIELD: The oil yield (fresh weight, w/w) was 0.1%.
REFERENCE ON ESSENTIAL OILS: Brophy et al. 1993
NOTES: The species was reported by Elliot and Jones (1993) to be a good plant for coastal areas with exposure to wind-borne salt.

Melaleuca ***huegelii*** Endl.

TAXONOMY: Two subspecies are recognised in this species: subsp. *huegelii* and subsp. *pristicensis* Barlow

PUBLICATION: *Enumeratio plantarum quas in Novae Hollandiæ ora austro-occidentali ad fluvium Cygnorum et in sinu Regis Georgii collegit Carolus Liber Baro de Hügel* 48 (1837), subsp. *huegelii*; in Quinn, Cowley, Barlow & Thiele, *Nuytsia* 8: 338, fig. 3 (1992), subsp. *pristicensis*

DERIVATION: *huegelii*, in honour of Karl A.A. von Hügel (1795–1870), a German-born naturalist who travelled for six years in India, Ceylon, Australasia and the Philippines, during which he collected the type specimen of this species; *pristicensis*, from the Greek *pristis*, shark, sawfish, in reference to the occurrence of the subspecies at Shark Bay, Western Australia

DESCRIPTION: *Shrub or tree* 1.1–5 m tall; bark dark. *Branchlets* glabrescent, hairy or rarely glabrous, puberulous. *Leaves* alternate, peltate, 1.3–10 mm long, 1–2.5 mm wide, 1.2–3.5 times as long as wide, sessile; blade glabrescent, marginal indumentum of short puberulous hairs, ovate, broadly ovate or rarely subulate, in transverse section shallowly lunate, lunate, transversely semielliptic or sublunate, the base truncate, the apex acuminate to narrowly acute, acute or rarely obtuse, the veins longitudinal, 5–17, *oil glands* moderately dense, distinct to obscure, scattered to more or less in rows. *Inflorescences* spicate, pseudoterminal and sometimes also upper axillary, with (1–)5–140 triads, up to 25 mm wide. *Hypanthium* glabrous, 1.2–2 mm long. *Calyx lobes* abaxially glabrous, costate, 0.7–1 mm long, scarious in a marginal band 0.1–0.2 mm wide. *Petals* deciduous, 1.5–3 mm long. *Stamens* 6–13 per bundle; filaments white, cream, pink or mauve, 7–11 mm long, the bundle claw 3–6.8 mm long, 0.4–0.7 times as long as the filaments. *Style* 7–11 mm long. *Ovules* 12–15 per locule. *Fruit* 2.3–2.8 mm long, with weakly developed and scarcely persisting sepaline teeth (the calyx lobes persist to mature fruit with the proximal portion becoming woody and the the distal portion weathering away); cotyledons obvolute.

NATURAL OCCURRENCE: **subsp. *huegelii*:** Western Australia: from the Walkaway district to the Augusta district. **subsp. *pristicensis*:** Western Australia: the Shark Bay district.

ECOLOGY: **subsp. *huegelii*:** Recorded as occurring in heathland on limestone ridges, open woodland, on coastal cliffs, and sand over limestone. **subsp. *pristicensis*:** Recorded as occurring in heathland, *Acacia* shrubland, and on sand.

FLOWERING TIME: **subsp. *huegelii*:** Recorded as flowering from August to January. **subsp. *pristicensis*:** Recorded as flowering from September to October.

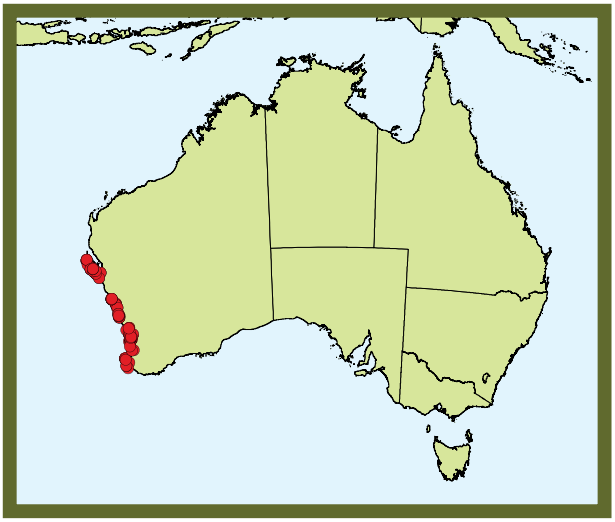
ESSENTIAL OILS: **subsp. *huegelii*:** This subspecies presented a complicated oil, with a significant number of components remaining unidentified. Monoterpenes identified in the leaf oil included α-pinene (7.5%), β-pinene (7.0%), α-terpineol (8.3%), limonene (1.8%), trans-pinocarveol (1.7%), both carveol isomers (total 2%) and a suspected dehydrocineole (2.5%). Sesquiterpenes identified included globulol (10.2%), spathulenol (2.8%), viridiflorol (1.5%) and two unidentified oxygenated sesquiterpenes (3.8% and 2.2%). Also present were some unidentified compounds of molecular weight 170 (9.6% and 2.0%), suspected of being hydrocarbons, and two other unknown components (2.7% and 4.3%). **subsp. *pristicensis*:** The oil obtained from this subspecies contained a greater percentage of sesquiterpenes than monoterpenes. The major sesquiterpenes detected were globulol (12.0%),

viridiflorol (10.2%) and bicyclogermacrene (12.0%). These were accompanied by lesser amounts of germacrene-D (2.7%), viridiflorene (2.1%), β-caryophyllene (1.8%), cubeban-11-ol (3.9%) and spathulenol (2.5%). The principal monoterpene encountered was α-pinene (13.7%), and this was accompanied by lesser amounts of β-pinene (1.3%) and α-terpineol (1.1%).

OIL YIELD: **subsp. *huegelii*:** The oil yield (fresh weight, w/w) was <0.1%. **subsp. *pristicensis*:** The oil yield (fresh weight, w/w) was <0.1%.

NOTES: The two subspecies may be distinguished as follows: **subsp. *huegelii*:** Inflorescence with 5–140 triads (usually more than 20), the axis hairy; staminal filaments 7–9 mm long, the filaments white or cream. **subsp. *pristicensis*:** Inflorescence with 1–14 triads, the axis hairy to glabrescent; staminal filaments 8.5–11 mm long, the filaments pink or mauve.

Melaleuca huegelii, as represented by the typical subspecies, is a plant of horticultural merit and it can be grown in a wide range of soil types in dry and humid temperate climates. Holliday (2004) reported that a form with purple flower buds but white flowers is particularly attractive.



Melaleuca ***huttensis*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 881 (1999)

DERIVATION: *huttensis*, from the locality Hutt River, Western Australia

DESCRIPTION: *Shrub* 2.5 m tall. *Branchlets* glabrescent, pubescent to puberulous. *Leaves* alternate, 3.5–6.6 mm long, 3.2–5.8 mm wide, 0.9–1.4 times as long as wide, subsessile to short-petiolate; blade glabrescent, puberulous, broadly ovate or subcircular, in transverse section transversely linear, the base cuneate to rounded, the apex obtuse to rounded or rarely acute or broadly acute, the veins longitudinal to longitudinal-pinnate, 5 longitudinal veins, with some poorly developed reticulate veins also, *oil glands* moderately dense or dense, obscure, more or less in rows. *Inflorescences* capitate, pseudoterminal, with 1–14 triads, up to 22 mm wide. *Hypanthium* hairy, 2–2.8 mm long. *Calyx lobes* abaxially hairy, 0.5–1.2 mm long, scarious throughout. *Petals* caducous, 2–2.7 mm long. *Stamens* 10–12 per bundle; filaments cream, white, yellow or pale whitish-lemon, ageing to pale salmon, 5.7–9.5 mm long, the bundle claw 1.8–4.6 mm long, 0.3–0.7 times as long as the filaments. *Style* 9–10.5 mm long. *Ovules* c. 10–15 per locule. *Infructescences* peg-fruited (occasionally approaching globose). *Fruit* 4–5 mm long, with sepaline teeth; cotyledons obvolute.

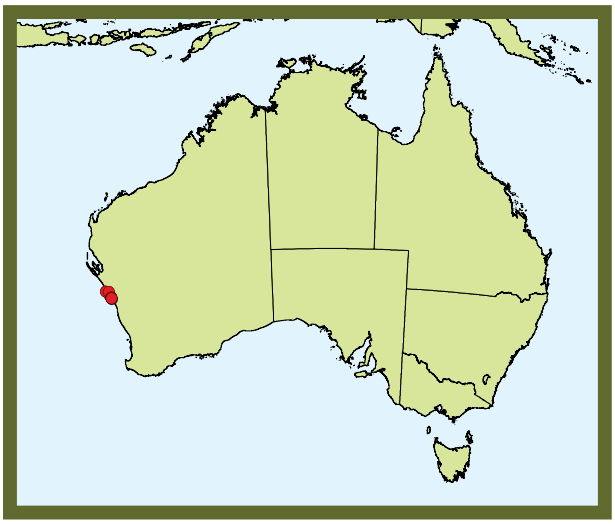
NATURAL OCCURRENCE: Western Australia: the Hutt River district.

ECOLOGY: Recorded as occurring in open *Melaleuca* shrubland, on sand, and river banks.

FLOWERING TIME: Recorded as flowering from August to October.

ESSENTIAL OILS: The leaf oil of this species contained significant amounts of monoterpenes. The principal component was linalool (35–45%) and this was accompanied by lesser amounts of α-pinene (14–20%), β-pinene (0.5–5.0%), 1,8-cineole (0.4–10.0%) and α-terpineol (1–3%). The principal sesquiterpenes encountered in the oil were globulol (2–7%), viridiflorol (1–4%), spathulenol (0.9–4.0%), bicyclogermacrene (1–4%) and α-cadinol (1–8%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.2–0.4%.



Melaleuca hypericifolia Sm.

PUBLICATION: *Transactions of the Linnean Society of London* 3: 279 (1797)

DERIVATION: *hypericifolia*, from *Hypericum*, a genus of Hypericaceae, and the Latin *folium*, leaf, in reference to the similarity between the leaves of this species and those of a species of *Hypericum*

DESCRIPTION: *Shrub* 1–5 m tall; bark papery. *Branchlets* soon glabrescent, the lanuginulose-puberulous to puberulous or lanuginulose hairs ephemeral. *Leaves* decussate, 10–40 mm long, 4–14 mm wide, 1.5–5 times as long as wide, short-petiolate; blade soon glabrescent, the lanuginulose-puberulous to puberulous or lanuginulose hairs ephemeral (the puberulous hairs predominantly along the midrib with the other hair types mainly at the base of the lamina), narrowly elliptic or narrowly obovate, in transverse section 'bird-winged' (occasionally transversely linear but this may be an artefact), the base cuneate, the apex acute, broadly acute or obtusely shortly acuminate, the veins pinnate, 10–20, *oil glands* dense, distinct, scattered. *Inflorescences* spicate, lateral (usually developing on older wood), with 10–40 monads, up to 60 mm wide. *Hypanthium* glabrous, 2.3–3.2 mm long. *Calyx lobes* abaxially glabrous, 1.5–2 mm long, scarious in a marginal band 0–0.3 mm wide or rarely herbaceous to the margin. *Petals* deciduous, 4.5–7 mm long. *Stamens* 16–25 per bundle; filaments red, reddish-orange or salmon-red, 20–27 mm long, the bundle claw 8–17.5 mm long, 0.6–0.9 times as long as the filaments. *Style* 18.5–30 mm long. *Ovules* c. 150–180 per locule. *Fruit* 5–6.5 mm long, with sepaline teeth; cotyledons obvolute.

NATURAL OCCURRENCE: New South Wales: from the Sydney district to the Bermagui district.

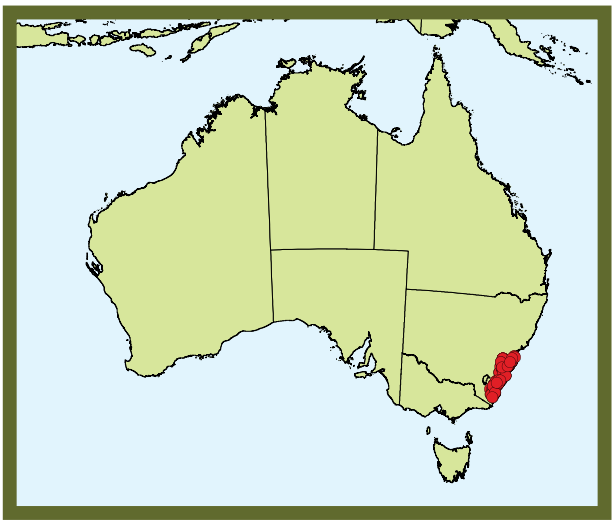
ECOLOGY: Recorded as occurring in dry sclerophyll forest, rocky heath, wet heath, on sandy cliff tops, loam among granite, coastal clay cliffs, and sandstone.

FLOWERING TIME: Recorded as flowering from September to May.

ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal components were 1,8-cineole (80%), limonene (8–9%), α-pinene (4–6%) and α-terpineol (1–2%). Sesquiterpenes, though numerous, did not contribute much to the oil, with the principal components being globulol (0.3%) and spathulenol (0.3–0.5%). E-methyl cinnamate (0.3%) was also detected in the oil.

OIL YIELD: The oil yield (fresh weight, w/w) was 0.3–0.6%.

NOTES: This species is widely cultivated in temperate regions of Australia as an ornamental shrub as it is adaptable to a wide range of soils and is moderately frost hardy. However, the flowers are produced inside the bush and are not readily visible.



Melaleuca idana Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 882 (1999)

DERIVATION: *idana*, from the Greek *idanos*, fair, comely, in reference to the attractive flowers of this species

DESCRIPTION: ***Shrub*** 0.5–1 m tall. ***Branchlets*** at length glabrescent, sericeous. ***Leaves*** alternate, 6–22 mm long, 0.7–1 mm wide, 7.5–30 times as long as wide, sessile to subsessile; blade at length glabrescent, sericeous, linear to linear-obovate, in transverse section quadrate to broadly oblong, or subcircular to transversely elliptic or rarely sublunate, the base truncate or parallel (blade width equals petiole width), the apex acute to obtuse, the veins longitudinal, 3, ***oil glands*** moderately dense, distinct or obscure, more or less in rows to scattered. ***Inflorescences*** capitate, pseudoterminal, with 3–6 triads, up to 33 mm wide. ***Hypanthium*** hairy, 1.5–2 mm long. ***Calyx lobes*** abaxially hairy, 0.3–0.5 mm long, scarious in a marginal band 0.1–0.2 mm wide or scarious throughout. ***Petals*** deciduous, 1.5–2.5 mm long. ***Stamens*** 6–10 per bundle; filaments pink, mauve, pinkish-mauve or deep purple, 8–12.5 mm long, the bundle claw 1.5–4 mm long, 0.2–0.4 times as long as the filaments. ***Style*** 11–13 mm long. ***Ovules*** c. 12–15 per locule. ***Infructescences*** peg-fruited. ***Fruit*** 3.5–5 mm long, the calyx lobes weathering away; cotyledons subobvolute (almost planoconvex) to obvolute.

NATURAL OCCURRENCE: Western Australia: the Wannoo–Kalbarri district.

ECOLOGY: Recorded as occurring in heath, woodland, and on sand.

FLOWERING TIME: Recorded as flowering from August to October.

ESSENTIAL OILS: This species presented a monoterpenoid oil and while there was a significant number of sesquiterpenes present, they contributed very little to the oil. The principal monoterpenes identified were 1,8-cineole (45–52%) and α-pinene (14–21%). These were accompanied by lesser amounts of β-pinene (0.7–5.0%), limonene (1–3%) and α-terpineol (2–6%). The main sesquiterpenes encountered were spathulenol (4–5%), globulol (2–3%), viridiflorol (1–2%) and β-caryophyllene (0.2–1.0%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.4–1.2%.

Melaleuca incana R.Br.

TAXONOMY: Two subspecies are recognised in this species: subsp. *incana* and subsp. *tenella* (Benth.) Barlow

PUBLICATION: *Edwards's Botanical Register* 5: t. 410 (1819), subsp. *incana*; in Quinn, Cowley, Barlow & Thiele, *Nuytsia* 8: 340 (1992), subsp. *tenella*

DERIVATION: *incana*, from the Latin *incanus*, hoary, white, in reference to the colour of the leaves; *tenella*, from the Latin *tener*, soft, delicate, in reference to the appearance of the type specimen of this plant

DESCRIPTION: *Shrub* 0.4–5 m tall; bark fibrous or flaky. *Branchlets* glabrescent, pubescent and occasionally with some shorter lanuginose-pubescent hairs also, or with lanuginulose-puberulous to puberulous hairs and then often with some sericeous-lanuginulose hairs also. *Leaves* ternate or often subternate, rarely quaternate, 3.5–17 mm long, 0.5–3.5 mm wide, 2.2–12 times as long as wide, subsessile to rarely short-petiolate; blade glabrescent, pubescent to lanuginose-pubescent or puberulous to lanuginulose-puberulous, rarely minutely sericeous-pubescent, very narrowly elliptic, very narrowly ovate, linear-elliptic, linear-ovate, narrowly elliptic or narrowly ovate, in transverse section sublunate, lunate, transversely linear, transversely narrowly elliptic or transversely semielliptic, the base attenuate or rarely narrowly cuneate or rounded, the apex acute to rarely obtuse, the veins longitudinal, 3, *oil glands* moderately dense or sparse, distinct to obscure, more or less in rows. *Inflorescences* spicate (sometimes shortly so), pseudoterminal or lateral (when lateral, upper axillary or on branchlets below the leaves), with 6–55 monads, up to 15 mm wide. *Hypanthium* hairy, glabrescent or glabrous, 0.9–2.2 mm long. *Calyx lobes* abaxially glabrous or glabrescent, 0.4–1 mm long, scarious in a marginal band up to 0.3 mm wide or herbaceous to the margin. *Petals* deciduous, 0.7–2 mm long. *Stamens* 3–11 per bundle; filaments cream, white, yellow or yellow and white, 3.5–8 mm long, the bundle claw 0.5–2.5 mm long, 0.2–0.3 times as long as the filaments. *Style* 5–11 mm long. *Ovules* 17–35 per locule. *Fruit* 1.5–4 mm long, with sepaline teeth; cotyledons planoconvex.

NATURAL OCCURRENCE: **subsp. *incana*:** Western Australia, Victoria: from the Moore River district south to the Albany district, and also occurs inland in the Dryandra district; naturalised locally in Victoria. **subsp. *tenella*:** Western Australia: from the Esperance–Wharton district to the Cape Arid district.

ECOLOGY: **subsp. *incana*:** Recorded as occurring in winter-wet swamp, low closed heath, *Melaleuca* swamp, low eucalypt woodland, along stream lines, on peaty soil, sand over laterite, and peaty clay. **subsp. *tenella*:** Recorded as occurring in moist heathland, swamp edges, on sand, and sand over laterite.

FLOWERING TIME: **subsp. *incana*:** Recorded as flowering from April to January. **subsp. *tenella*:** Recorded as flowering from August to October.

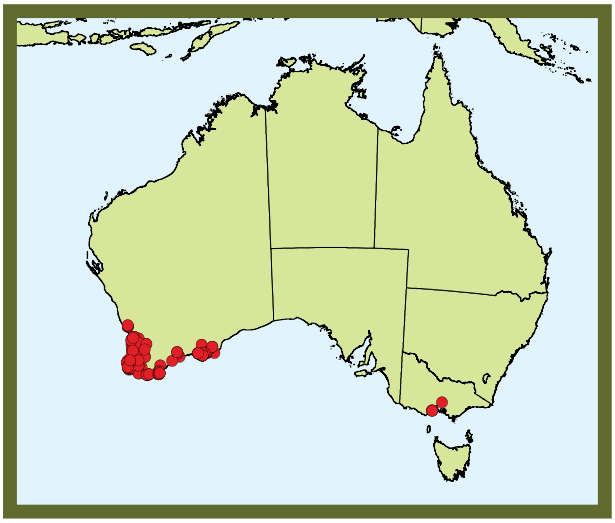
ESSENTIAL OILS: **subsp. *incana*:** The oil from this subspecies contained many more sesquiterpenes than monoterpenes, and they contributed much more to the oil. The principal sesquiterpenes identified were bicycloelemene (10.4%), bicyclogermacrene (3.9%), β-caryophyllene (2.0%), viridiflorene (4.1%), aromadendrene (1.8%), globulol (18.3%), viridiflorol (6.6%) and spathulenol (11.1%). The principal monoterpenes were 1,8-cineole (10.4%), geraniol (1.6%) and terpinen-4-ol (2.0%); no other monoterpene being greater than 0.2%. A second chemotype was found in a sample from the

Australian National Botanic Gardens (ANBG 9806470). In this collection, many more monoterpenes were found, with the principal monoterpenes being 1,8-cineole (44.0%), limonene (2.6%) and α-terpineol (1.3%). The main sesquiterpenes were bicyclogermacrene (14.5%), globulol (6.0%), viridiflorol (4.1%) and spathulenol (3.2%). An unidentified aromatic compound, molecular weight 222, was also present (4.0%). **subsp. *tenella*:** This subspecies produced a leaf oil in which both mono- and sesquiterpenes were well represented, though sesquiterpenes predominated. The principal monoterpenes encountered were 1,8-cineole (13.3%), methyl geranate (1.9%) and α-pinene (1.2%). The main sesquiterpenes were spathulenol (16.8%), bicyclogermacrene (13.3%), globulol (9.0%), viridiflorol (5.0%), cubeban-11-ol (2.4%) and β-caryophyllene (1.0%).

OIL YIELD: **subsp. *incana*:** The oil yield (fresh weight, w/w) was 0.1%, and 0.5% (dry weight, w/w) for the ANBG sample. **subsp. *tenella*:** The oil yield (fresh weight, w/w) was <0.1%.

NOTES: The two subspecies are distinguished as follows: **subsp. *incana*:** Leaves 3.5–17 mm long, 0.5–3.5 mm wide, leaf blade indumentum composed of longish, spreading pubescent to lanuginose-pubescent or puberulous to lanuginulose-puberulous hairs. **subsp. *tenella*:** Leaves 3.5–9 mm long, 0.5–1.1 mm wide, leaf blade indumentum composed of lanuginulose-puberulous to puberulous hairs (rarely approaching pubescent).

Forms of *M. incana* with particularly greyish foliage are commonly cultivated in temperate Australia as ornamental shrubs as the greyish, slightly weeping branchlets contrast well with the creamy yellow flowers.



Melaleuca interioris Craven & Lepschi

PUBLICATION: in Craven, Lepschi, Broadhurst & Byrne, *Australian Systematic Botany* 12: 263 (2004)

DERIVATION: *interioris*, from the Latin *interior*, inner, interior, in reference to the occurrence of this species in the inland regions of Australia

DESCRIPTION: *Shrub or tree* to 3 m tall; bark papery, flaking. *Branchlets* usually glabrescent but sometimes remaining hairy, with sericeous-pubescent or sericeous hairs (usually with some lanuginulose hairs also). *Leaves* spreading-ascending or ascending, 6–56 mm long (often 20–45), 0.6–1.2 mm wide, 7.5–72 times as long as wide (often 30–40), petiole 0.3–2 mm long; blade glabrescent, sericeous-pubescent (and then with some lanuginulose) or sericeous to sericeous-lanuginulose, linear or linear-elliptic, in transverse section transversely elliptic, semitransversely broadly elliptic, subcircular, quadrate or depressed obovate, in lateral view straight, incurved or recurved, the base very narrowly cuneate or narrowly cuneate, the apex narrowly acuminate, acuminate, aristate or narrowly acute, *oil glands* scattered. *Inflorescences* capitate, with 4–9 triads. *Hypanthium* 0.9–1.4 mm long, 1.2–1.8 mm wide. *Calyx lobes* 1–5 (the sepaline tissue is variously lobed and is sometimes entire, hence '1-lobed'), connate at the base or entirely connate, abaxially hairy or glabrous, 0.3–0.6 mm long. *Petals* caducous, subcircular to circular, or very broadly ovate, 1.1–1.3 mm long, oil glands elliptic to circular. *Stamens* 4–9 per bundle, the filaments yellow, 2.5–4 mm long, the bundle claw 0.8–2 mm long, 0.3–0.8 times as long as the filaments. *Style* 4.3–6.4 mm long. *Ovules* 7–19 per locule. *Infructescences* as wide as long, or slightly longer or shorter than wide, 3.8–8 mm wide, the constituent fruits 'peg-like' and retaining a significant separate identity (the fruiting hypanthia divergent with respect to their closest neighbours). Seeds 0.6–0.9 mm long, the cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia, Northern Territory, South Australia, Queensland, New South Wales: from the central-western region of Western Australia eastwards to the far south-western districts of Queensland and the far north-western districts of New South Wales.

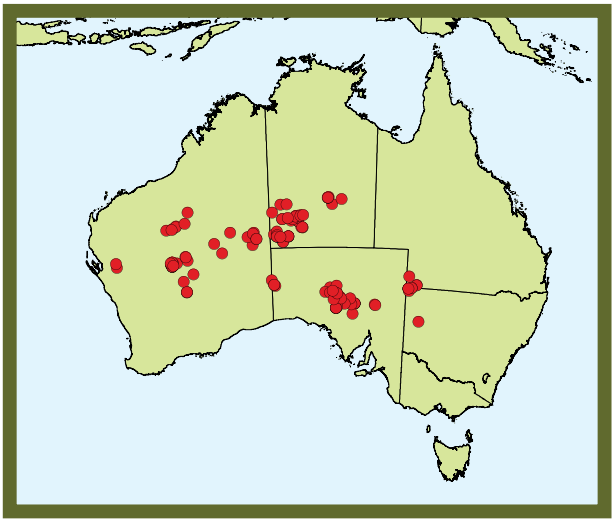
ECOLOGY: Recorded as occurring in open shrubland of acacia, eucalypts, spinifex and grasses, open *Eucalyptus* scrub, *Melaleuca* shrubland with scattered *Eucalyptus microtheca* trees, *Acacia* shrubland with some scattered shrubs and eucalypts, very open *Acacia–Eremophila–Cratystylis* shrubland, with *Eucalyptus socialis* and *Triodia*, mulga woodland with chenopods and forbs, on red sand, fringes of saline pan, sand over limestone, low dunes near creek in deep loose sand, margin of salt lake above samphire, red fine sandy clay loam with laterite pebbles, clay soil, sand plain, sandy red earth fringing clay pan, calcrete, and red clay over laterite.

FLOWERING TIME: Recorded as flowering from August to November.

ESSENTIAL OILS: The leaf oil of this species contained a mixture of mono- and sesquiterpenes. The principal monoterpenes were α-pinene (13.7%), 1,8-cineole (6.2%), pinocarvone (3.6%), citronellol (2.6%) and p-cymene (2.7%). The principal sesquiterpenes were spathulenol (11.1%), elemol (3.5%), ledol (2.6%), β-elemene (2.2%) and α-copaene (2.1%). There was a considerable number of oxygenated sesquiterpenes unidentified.

OIL YIELD: The oil yield (dry weight, w/w) was 0.2%.

REFERENCE ON ESSENTIAL OILS: Brophy et al. 2006b



Melaleuca irbyana R.T.Baker

PUBLICATION: *Proceedings of the Linnean Society of New South Wales* 37: 587, t. LXIV (1913)

DERIVATION: *irbyana*, in honour of a forester, L.G. Irby (1883–1964), who collected the type specimen

SYNONYM: *Melaleuca tamariscina* subsp. *irbyana* (R.T.Baker) Barlow

DESCRIPTION: *Tree or shrub* 4–10 m tall; bark papery. *Branchlets* glabrescent or glabrous, puberous when hairy (often sparse and/or minute). *Leaves* alternate, peltate, 2–7 mm long (leaves on indeterminate shoots are 4–7mm long), 1–2 mm wide (on indeterminate shoots 1–1.5 mm wide), 1.1–4.7 times as long as wide (on indeterminate shoots 4–4.7 times as long as wide), sessile; blade glabrescent, puberulous, elliptic, narrowly ovate, very narrowly ovate or ovate, in transverse section transversely linear, the base truncate or rarely broadly cuneate, the apex acuminate to acute or narrowly acuminate, the veins longitudinal, 7–13, *oil glands* moderately dense, distinct to rarely obscure, in rows. *Inflorescences* spicate, interstitial or pseudoterminal, with 3–12 monads, up to 14 mm wide. *Hypanthium* glabrous, 1–1.7 mm long. *Calyx lobes* abaxially glabrous, costate, 0.5–0.6 mm long, scarious in a marginal band 0.1–0.2 mm wide. *Petals* deciduous, 1.5–1.9 mm long. *Stamens* 6–11 per bundle; filaments creamy-white to white, 6.2–7.1 mm long, the bundle claw 2.5–2.7(–3.5) mm long, 0.4–0.5 times as long as the filaments. *Style* 5–9 mm long. *Ovules* c. 15–30 per locule. *Fruit* 3.5–4 mm long, the calyx lobes weathering away (the extreme proximal portion may become woody and persist as undulations on the rim); cotyledons obvolute.

NATURAL OCCURRENCE: Queensland, New South Wales: from the Ipswich district in Queensland south to the Casino district in New South Wales.

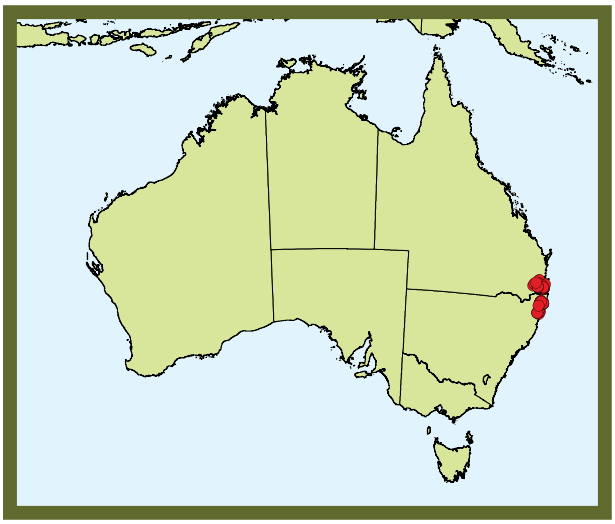
ECOLOGY: Recorded as occurring in grassy open eucalypt forest, scrubland, swampy areas in savannah, on clay loam, sandy soil, and sand over clay.

FLOWERING TIME: Recorded as flowering from September to January.

ESSENTIAL OILS: This species produced an oil with both mono- and sesquiterpenes being significant components. The principal monoterpenes encountered were α-pinene (9–24%) and β-pinene (10–18%). There were lesser amounts of limonene (1–3%) and α-terpineol (0.7–2.0%). The principal sesquiterpenes encountered were β-caryophyllene (8–17%), δ-cadinene (2–15%), caryophyllene oxide (3–8%), E,E-farnesol (3–10%) and globulol (1–4%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.3–0.5%.

NOTES: *Melaleuca irbyana* is cultivated in subtropical coastal Australia as an ornamental shrub.



Melaleuca johnsonii Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 883 (1999)

DERIVATION: *johnsonii*, in honour of Lawrence Alexander Sidney Johnson (1925–1997), an Australian taxonomist who published several stimulating studies of Myrtaceae

DESCRIPTION: *Shrub* 0.2–3 m tall; bark fibrous. *Branchlets* tardily glabrescent, sericeous or sometimes pubescent to rarely sericeous-pubescent. *Leaves* alternate, 7–16.5 mm long, 0.9–1.7 mm wide, 5.5–17 times as long as wide, short-petiolate to subsessile; blade tardily glabrescent, sericeous to occasionally distally sericeous-lanuginulose or sometimes pubescent to rarely sericeous-pubescent, linear, linear-obovate to linear-elliptic, very narrowly obovate or very narrowly elliptic, in transverse section subcircular to transversely elliptic, depressed obovate, flattened transversely semielliptic or quadrate, the base attenuate, parallel (blade width equals petiole width) or rarely narrowly cuneate, the apex shortly acuminate or rarely acute, the veins longitudinal, 3, *oil glands* moderately dense, distinct to rarely obscure, more or less in rows. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 4–7 triads, up to 13 mm wide. *Hypanthium* hairy, 0.5–1.2 mm long. *Calyx lobes* abaxially glabrous, 0.1–0.3 mm long, scarious throughout. *Petals* deciduous, 1–1.5 mm long. *Stamens* 3–5 per bundle; filaments yellow, cream, creamy-white, creamy-yellow or rarely pink (this from a population of yellow-flowered plants), 5.4–7 mm long, the bundle claw 1.8–3.1 mm long, 0.3–0.5 times as long as the filaments. *Style* 6.5–7.5 mm long. *Ovules* c. 20–30 per locule. *Infructescences* globose. *Fruit* 1.5–3 mm long, the calyx lobes soon weathering away; cotyledons planoconvex.

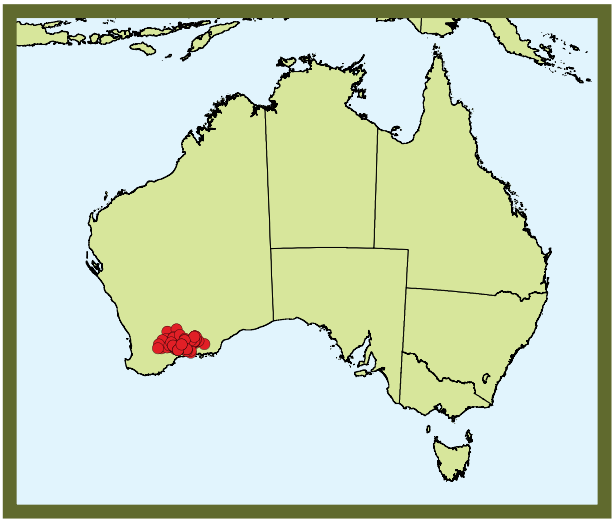
NATURAL OCCURRENCE: Western Australia: from the Hyden – Marvel Loch – Norseman district south to the Newdegate–Esperance district.

ECOLOGY: Recorded as occurring in mallee heath, mallee woodland with *Melaleuca* understorey, open shrub mallee, open scrubland, on sandy loam, sandy clay, sand over laterite, loamy sand over calcareous hardpan, and clay.

FLOWERING TIME: Recorded as flowering from August to November.

ESSENTIAL OILS: This species presented a predominantly monoterpenoid oil. The principal component was 1,8-cineole (44.4%) and there were significant amounts of α-pinene (7.4%), limonene (2.0%) and α-terpineol (5.4%). The principal sesquiterpene was spathulenol (9.1%) and there were lesser amounts of globulol (3.7%), viridiflorol (1.5%), cubeban-11-ol (1.0%) and bicyclogermacrene (0.8%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.4%.



Melaleuca ***keigheryi*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 883 (1999)

DERIVATION: *keigheryi*, in honour of Gregory John Keighery (1950–), a botanist who has made collections of many interesting plant species in Western Australia

DESCRIPTION: *Shrub* 1–2.5 m tall; bark papery, fading whitish. *Branchlets* glabrescent, pubescent. *Leaves* alternate, 12–23 mm long, 2.4–5.2 mm wide, 2.4–7 times as long as wide, subsessile to rarely short-petiolate; blade glabrescent, sericeous and becoming lanuginose-sericeous to lanuginose-pubescent or lanuginose at the apex, rarely pubescent, narrowly obovate, very narrowly obovate or obovate, in transverse section transversely linear, the base attenuate, the apex acuminate or obtusely shortly acuminate, the veins pinnate or rarely longitudinal-pinnate, c. 6–9 pinnate veins, *oil glands* moderately dense, obscure to distinct, scattered. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 4–9 triads, up to 25 mm wide. *Hypanthium* hairy, 1–1.5 mm long. *Calyx lobes* abaxially hairy or glabrescent, 0.3–0.5 mm long, scarious throughout or rarely scarious in a marginal band 0.1–0.2 mm wide. *Petals* caducous, 1.5–2.3 mm long. *Stamens* 6–10 per bundle; filaments purple to mauve, purplish-pink or fading to white, 6.5–10.5 mm long, the bundle claw 1.8–3.3 mm long, 0.3–0.4 times as long as the filaments. *Style* 8.5–13 mm long. *Ovules* c. 15–20 per locule. *Infructescences* globose. *Fruit* 3–4 mm long, the calyx lobes weathering away; cotyledons obvolute.

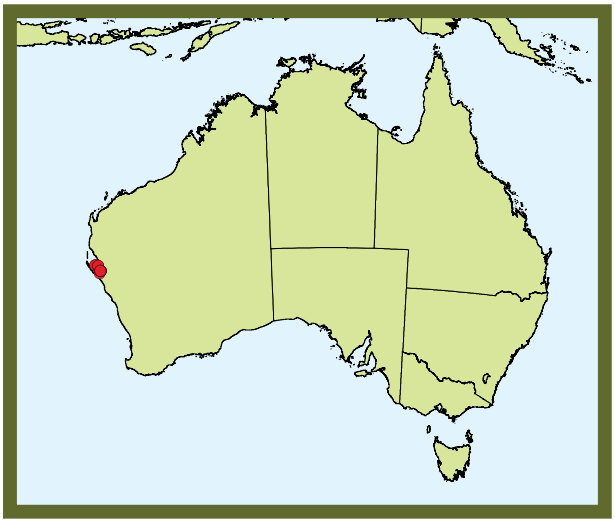
NATURAL OCCURRENCE: Western Australia: the Shark Bay district.

ECOLOGY: Recorded as occurring in mallee heathland, scrub, and on sand.

FLOWERING TIME: Recorded as flowering from August to October.

ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal monoterpene was 1,8-cineole (55–63%) and this was accompanied by lesser amounts of α-pinene (4–6%), limonene (3–8%), terpinen-4-ol (1–3%), linalool (1–2%) and α-terpineol (5–8%). The principal sesquiterpenes identified in the oil were E,E-farnesol (0.7–2.0%), E,E-farnesal (0.7–2.0%), and spathulenol (0.3–0.5%); no other sesquiterpene being greater than 0.3%.

OIL YIELD: The oil yield (fresh weight, w/w) was 0.8–1.5%.



Melaleuca ***kunzeoides*** Byrnes

PUBLICATION: *Austrobaileya* 2: 75 (1984)
DERIVATION: *kunzeoides*, from *Kunzea*, a genus of Myrtaceae, and the Greek *-oides*, resembling, in reference to a perceived similarity between this species and a species of *Kunzea*
DESCRIPTION: *Shrub* 1–1.5 m tall; bark papery. *Branchlets* soon glabrescent, the puberulous hairs ephemeral. *Leaves* alternate, 3.3–8 mm long, 1–2 mm wide, 2.3–5.4 times as long as wide, subsessile; blade soon glabrescent, the puberulous hairs ephemeral, suboblong, oblong, narrowly ovate, narrowly elliptic or narrowly obovate, in transverse section sublunate, transversely elliptic or flattened transversely semielliptic, the base cuneate or attenuate, the apex obtusely shortly acuminate or acuminate, the veins longitudinal, 1–3, *oil glands* moderately dense, distinct, scattered to more or less in rows. *Inflorescences* spicate, interstitial, with 5–17 monads, dyads or triads (usually monads to dyads, rarely in part triads), up to 14 mm wide. *Hypanthium* glabrescent, 1–1.5 mm long. *Calyx lobes* abaxially glabrous, 1–1.5 mm long, scarious in a marginal band up to 0.1 mm wide or herbaceous to the margin. Petals deciduous, 1.5–2 mm long. *Stamens* 4–6 per bundle; filaments yellow-green (or white?), 6–6.8 mm long, the bundle claw 3–3.5 mm long, 0.5 times as long as the filaments. *Style* 4–5.5 mm long. *Ovules* c. 25–30 per locule. *Fruit* 1.3–1.8 mm long, the calyx lobes persistent; cotyledons planoconvex.

NATURAL OCCURRENCE: Queensland: the Adavale district.
ECOLOGY: Recorded as occurring on dissected residual rock.
FLOWERING TIME: Recorded as flowering in April and November.
ESSENTIAL OILS: The leaf oil of this species was dominated by α-, β- and γ-eudesmol (23–26%, 36–39%, 10–13%, respectively), which between them accounted for over 70% of the oil. Also present were elemol (1–3%) and several oxygenated sesquiterpenes ($C_{15}H_{26}O$) in the range of 3–6%. No sesquiterpene hydrocarbons were detected. The principal monoterpenes detected in the oil were α-pinene (3–5%), β-pinene (1–3%), limonene (1–2%), p-cymene (1–2%) and α-terpineol (0.5–2.0%).
OIL YIELD: The oil yield (dry weight, w/w) was 2.0–2.2%.