

## Melaleuca pachyphylla (Cheel) Craven



**PUBLICATION:** *Novon* 16: 472 (2006)

**DERIVATION:** *pachyphylla*, from the Greek, *pachys*, thick, and *phyllon*, leaf, in reference to the thick leaves

**SYNONYM:** *Callistemon pachyphyllus* Cheel

**DESCRIPTION:** *Shrub* 0.5–3 m tall. *Branchlets* glabrescent, sericeous to pubescent, sometimes overlaid with velutinous hairs. *Leaves* alternate, 25–119 mm long, 3–15 mm wide, 4.5–25 times as long as wide, short-petiolate; blade glabrescent, sericeous or sericeous-pubescent, very narrowly obovate, narrowly obovate or narrowly elliptic, in transverse section transversely linear or sublunate, the base very narrowly cuneate or very narrowly attenuate, the apex obtusely shortly acuminate or very shortly acuminate, the veins pinnate, 11–22, *oil glands* sparse, obscure, scattered. *Inflorescences* spicate, pseudoterminal or interstitial, with 30–90 monads, 45–65 mm wide. *Hypanthium* hairy or glabrescent, 3.6–5 mm long. *Calyx lobes* abaxially hairy,

1–2.3 mm long, herbaceous to the margin. *Petals* deciduous, 3.5–6.9 mm long. *Stamens* 27–45 per flower; filaments red or green (once described as creamish), 23–31 mm long; anthers purple or greenish-yellow. *Style* 28–37 mm long. *Ovules* c. 250–350 per locule. *Fruit* 3.9–7.5 mm long, the calyx lobes deciduous; cotyledons obvolvate.

**NATURAL OCCURRENCE:** Queensland, New South Wales: from the Hervey Bay district in Queensland to the Port Stephens district in New South Wales.

**ECOLOGY:** Recorded as occurring in swampy heathland, wet places in wallum flats, *Melaleuca quinquenervia* woodland, steep rocky north-facing slope, open forest, on sand, skeletal light-brown soil on rock, and peat swamp.

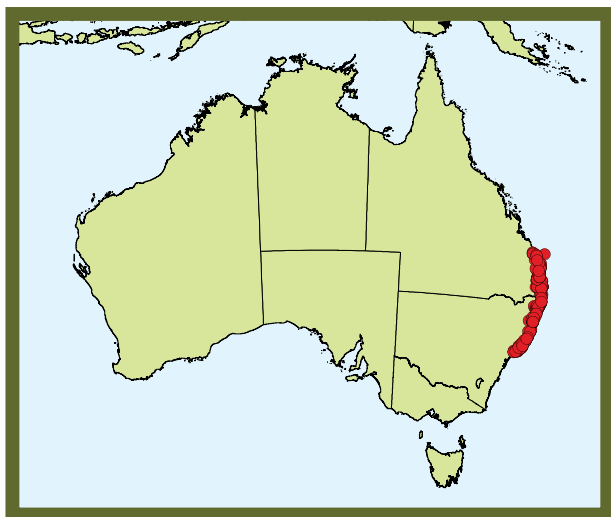
**FLOWERING TIME:** Recorded as flowering from January to December.

**ESSENTIAL OILS:** This species produced an oil in which monoterpenes predominated, though sesquiterpenes were numerous. The principal monoterpenes were  $\alpha$ -pinene (37.5%),  $\alpha$ -phellandrene (11.7%) and 1,8-cineole (19.1%), with lesser amounts of  $\beta$ -pinene (1.8%), limonene (5.5%), myrcene (1.8%) and  $\alpha$ -terpineol (2.7%). The main sesquiterpenes encountered (of many) were  $\beta$ -caryophyllene (3.8%), globulol (1.1%) and spathulenol (0.5%).

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

**REFERENCE ON ESSENTIAL OILS:** Brophy et al. 1998, as *Callistemon pachyphyllus*

**NOTES:** There is variation in flower colour within this species and it should be possible to select superior colour forms for use as ornamental shrubs in subtropical and temperate regions. Bushiness should also be a selection criterion as Elliot and Jones (1993) and Wrigley and Fagg (1993) reported that pruning is required to produce a shapely plant.



## *Melaleuca pallescens* Byrnes



**PUBLICATION:** *Austrobaileya* 2: 74 (1984)

**DERIVATION:** *pallescens*, from the Latin *paleo*, to be pale, in reference to the pale colour of the flowers

**SYNONYM:** *Melaleuca tamariscina* subsp. *pallescens* (Byrnes) Barlow

**DESCRIPTION:** *Tree or shrub* 1–4 m tall; bark hard or somewhat flaky, black or dark grey. *Branchlets* glabrous. *Leaves* alternate, peltate, 1.3–5.5 mm long, 0.7–1.2 mm wide, 1.4–10 times as long as wide, sessile; blade glabrous or sometimes glabrescent (a few minute marginal cilia may be present), ovate, narrowly ovate or very narrowly ovate (more or less rounded angular-ovate), in transverse section strongly depressed obtriangular, the base truncate, the apex acuminate to narrowly acute, obtusely shortly acuminate or narrowly acuminate, the veins longitudinal, 5–9, *oil glands* moderately dense, obscure, in rows. *Inflorescences* spicate, interstitial or pseudoterminal, with 3–12 triads (rarely monads and then 1–8 per inflorescence; monads occur in southern populations through suppression of lateral buds), up to 18 mm wide.

*Hypanthium* glabrescent or rarely glabrous, 1–1.8 mm long. *Calyx lobes* abaxially glabrescent or rarely glabrous, costate, 0.6–0.8 mm long, scarious in a marginal band 0.1–0.2 mm wide. *Petals* deciduous, 1.5–1.6 mm long. *Stamens* 5–9 per bundle; filaments pink-mauve at anthesis, soon ageing to white, 6–8.2 mm long, the bundle claw 3.5–4.1 mm long, 0.5–0.6 times as long as the filaments. *Style* 5–9 mm long. *Ovules* c. 15–40 per locule. *Fruit* 2.5–4 mm long, the calyx lobes usually weathering away (the extreme basal portion may become more or less woody and persist as undulations on the hypanthium rim); cotyledons obvolvate.

**NATURAL OCCURRENCE:** Queensland: from the central region south to southern and south-eastern Queensland.

**ECOLOGY:** Recorded as occurring in mixed open forest and shrubland, mallee scrubland, open eucalypt woodland, dense scrubland, on sandy loam, clay pan, and sandy loam over sandstone.

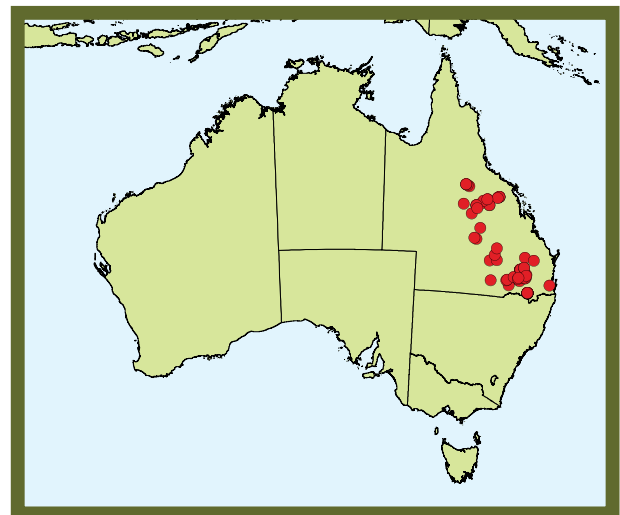
**FLOWERING TIME:** Recorded as flowering from September to November.

**ESSENTIAL OILS:** This species gave an oil in which monoterpenes, based on the pinene skeleton, were the major contributors. The principal components identified were  $\alpha$ -pinene (21–43%),  $\alpha$ -pinene oxide (3–6%), pinocamphone (7–14%), several unknown oxygenated monoterpenes (up to 10%) and  $\alpha$ -terpineol (3–5%). Sesquiterpenes did not contribute much to the oil. The main components were aromadendrene (1–3%) and globulol (2–5%). An unknown, molecular weight 236, suspected of being a phenolic ether (4–9%), was also present.

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

**REFERENCE ON ESSENTIAL OILS:** Brophy and Doran 1996

**NOTES:** This pinkish-mauve-flowered species is suited to subtropical regions and can be used as a background or screening shrub (Holliday 2004).





## Melaleuca pallida (Bonpl.) Craven



**PUBLICATION:** *Novon* 16: 472 (2006)

**DERIVATION:** *pallida*, from the Latin *palleo*, to be pale, in reference to the pale colour of the flowers

**SYNONYM:** *Callistemon pallidus* (Bonpl.) DC.

**DESCRIPTION:** *Shrub or tree* 1–25 m tall; bark fibrous or somewhat papery, hard, yellowish-brown, light brown or dark grey. *Branchlets* glabrescent, sericeous to sericeous-pubescent. *Leaves* alternate, 20–79 mm long, 4–17 mm wide, 2.3–7.5 times as long as wide, long- to short-petiole; blade glabrescent, sericeous or sericeous-pubescent, narrowly elliptic, narrowly obovate, elliptic or obovate, in transverse section transversely linear, sublunate or broadly v-shaped, the base attenuate or very narrowly attenuate, the apex shortly acuminate or obtusely shortly acuminate, the veins pinnate, 6–16, *oil glands* sparse or moderately dense, distinct or obscure, scattered. *Inflorescences* spicate, pseudoterminal and sometimes also upper axillary or interstitial, with 15–50 monads, 20–45 mm wide. *Hypanthium* hairy to glabrous, 3.1–4.2 mm long. *Calyx lobes* abaxially hairy or glabrescent, 1–2.2 mm long, herbaceous to the margin. *Petals* deciduous, 2.9–6 mm long. *Stamens* 34–70 per flower; filaments pale yellow, yellow, lemon or rarely pink or pinkish-red, 8–16 mm long; anthers yellow. *Style* 12–21 mm long. *Ovules* c. 70–150 per locule. *Fruit* 3.9–6.6 mm long, the calyx lobes deciduous; cotyledons obvolvate.

**NATURAL OCCURRENCE:** Queensland, New South Wales, Victoria, Tasmania: from the border ranges area of Queensland and New South Wales south to eastern Victoria and Tasmania.

**ECOLOGY:** Recorded as occurring in wet sclerophyll forest along streams, dense shrubbery on river edge, *Eucalyptus delegatensis* forest, margin of coastal heath on upper cliff face, swamp, rocky hillside, snow gum open forest, gully areas in dry sclerophyll forest, margin of *Nothofagus* temperate rainforest, *Eucalyptus pulchella* woodland with low shrub understorey, on an exposed ridge, limestone, and dolerite.

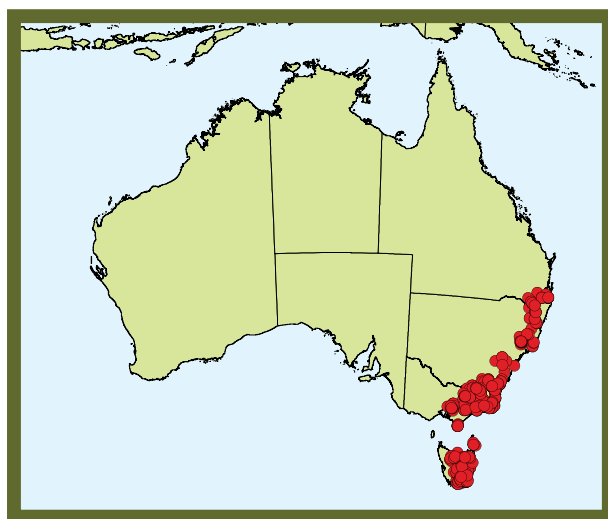
**FLOWERING TIME:** Recorded as flowering from October to February.

**ESSENTIAL OILS:** This species produced a monoterpenoid oil in which the principal components were  $\alpha$ -pinene (44–88%) and 1,8-cineole (0.1–37.0%). There were also lesser amounts of camphene (0.2–2.0%), limonene (1–4%) and  $\alpha$ -terpineol (0.9–5.0%). There were many other monoterpenes in amounts of less than 0.5% of the total oil. The major sesquiterpenes were spathulenol (0.4–0.9%) and globulol (0.3%).

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

**REFERENCE ON ESSENTIAL OILS:** Brophy et al. 1998, as *Callistemon pallidus*, *C. macrandus* (an unpublished name)

**NOTES:** This is a very variable species, usually occurring as a shrub but a tree form occurs in Tasmania. It is commonly cultivated as an ornamental garden shrub in temperate Australia but the tree form should be trialled for use in parks and larger gardens. Use of the tree form in hybridisation with red-flowered bottlebrush species, such as *M. citrina*, may give rise to a range of cultivars with tree form but novel flower colours.



## *Melaleuca paludicola* Craven



**PUBLICATION:** *Novon* 16: 472 (2006)

**DERIVATION:** *paludicola*, from the Latin *palus*, swamp, marsh, and *-cola*, inhabitant, dweller, the epithet having been selected to retain a link with an early name of the species, *Callistemon paludosus*

**SYNONYMS:** *Callistemon paludosus* F.Muell.; *Callistemon sieberi* DC.

**DESCRIPTION:** *Shrub or tree* 0.6–8 m tall; bark fibrous or flaking, hard, pale grey to blackish. *Branchlets* glabrescent, puberulous to sericeous. *Leaves* alternate, 20–68 mm long, 1.3–8 mm wide, 6–30 times as long as wide, short-

long-petiolate; blade glabrescent, lanuginose to sericeous, very narrowly elliptic, very narrowly obovate, linear-obovate or linear-elliptic, in transverse section transversely linear, sublunate or obsubulate, the base very narrowly attenuate or very narrowly cuneate, the apex acute or obtuse, the veins pinnate, 11–18, *oil glands* dense or moderately dense, distinct or obscure, scattered. *Inflorescences* spicate, pseudo-terminal or interstitial, with 10–40 monads, 20–30 mm wide. *Hypanthium* glabrous or hairy, 2.3–3.2 mm long. *Calyx lobes* abaxially hairy (sometimes only with cilia on the margin), 0.9–1.5 mm long, scarious in a marginal band 0.3 mm wide or herbaceous to the margin. *Petals* deciduous, 2.6–4.2 mm long. *Stamens* 48–67 per flower; filaments yellowish-cream, cream, yellow or rarely pink, 7–11 mm long; anthers pink. *Style* 10–15 mm long. *Ovules* c. 110–150 per locule. *Fruit* 3–4.3 mm long, the calyx lobes deciduous; cotyledons obvolvate.

**NATURAL OCCURRENCE:** South Australia, Queensland, New South Wales, Australian Capital Territory, Victoria: the Mt Lofty Ranges – Adelaide district in South Australia, and the Warwick – border region of Queensland, extending across the tablelands and coastal regions of New South Wales to central and eastern Victoria.

**ECOLOGY:** Recorded as occurring in riparian shrubland, dry sclerophyll forest, gorges, sand ridges between flood channels, on pale brown silty sand, rocky alluvium, and sand among granite rocks.

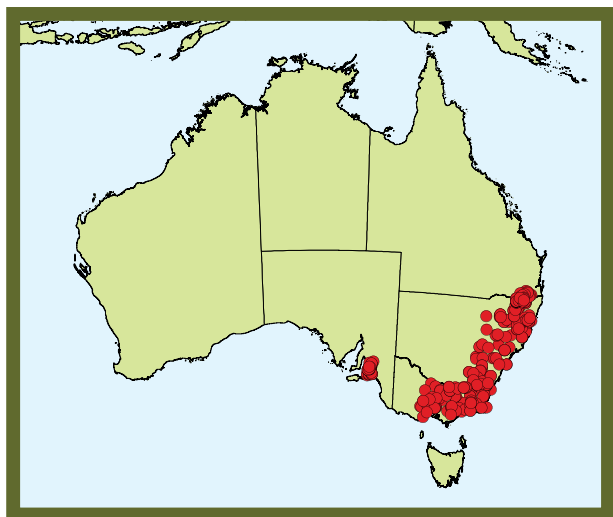
**FLOWERING TIME:** Recorded as flowering from October to May.

**ESSENTIAL OILS:** The oil from this species was predominantly monoterpenoid in nature, with 1,8-cineole (66%) being the major component. This was accompanied by lesser amounts of  $\alpha$ -pinene (2.5%),  $\beta$ -pinene (1.6%), limonene (10.0%), p-cymene (1.8%) and  $\alpha$ -terpineol (6.3%). Sesquiterpenes contributed approximately 10% of the oil, with the principal identified members being spathulenol (1.4%),  $\beta$ -caryophyllene (1.0%) and globulol (0.6%). This oil was obtained from a population at Girraween National Park, Queensland. Collections from Armidale, Rye Park and Braidwood, all New South Wales, produced no discernible oil.

**OIL YIELD:** The oil yield (fresh weight, w/w) was <0.01%.

**REFERENCE ON ESSENTIAL OILS:** Brophy et al. 1998, as *Callistemon sieberi*

**NOTES:** This bottlebrush species most recently was known as *Callistemon sieberi* but when transferring the species to *Melaleuca* a new epithet was necessary because *sieberi* had already been used for a plant from coastal Queensland, *M. sieberi* Schauer. *Melaleuca paludicola* previously had been confused with *M. pityoides* (as *C. pityoides*).





## *Melaleuca pancheri* (Brongn. & Gris) Craven & J.W.Dawson



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

**DERIVATION:** *pancheri*, in honour of Jean Armand Isidore Pancher (1814–1877), a French explorer and botanist who collected extensively in New Caledonia

**SYNONYM:** *Callistemon pancheri* Brongn. & Gris

**DESCRIPTION:** *Shrub or tree* to 10 m tall; *branchlets* hairy, the hairs woolly. *Leaves* 40–70 mm long, 15–20 mm wide, short- to long-petiolate; blade glabrescent, the hairs woolly, narrowly obovate, the base attenuate, the apex rounded, the veins longitudinal, 7–10. *Inflorescences* subspheroidal, pseudoterminal. *Hypanthium* 3–3.5 mm long. *Calyx lobes* with long appressed hairs on the abaxial surface,

1.2–1.8 mm long. *Petals* 3–5.5 mm long. *Stamens* 16–20 per flower; filaments yellow to yellowish green, 16–24 mm long. *Style* 24–30 mm long. *Fruit* 3 mm long.

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

**ECOLOGY:** Recorded as occurring in rainforests of hills or plains, or in maquis, in lateritic, more or less deep, colluvial soils on ultramafic substrates.

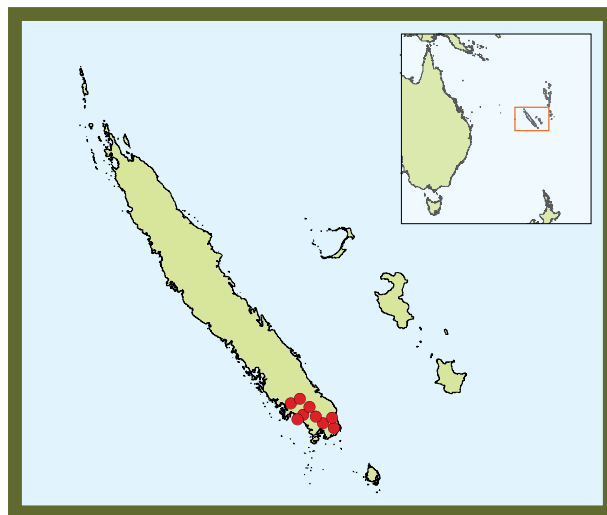
**FLOWERING TIME:** Recorded as flowering from May to August.

**ESSENTIAL OILS:** This species contained more sesquiterpenes than monoterpenes, though the principal component was  $\alpha$ -pinene (24.8%). This compound was accompanied by lesser amounts of linalool (4.0%),  $\beta$ -pinene and limonene (both 1.0%) and  $\alpha$ -terpineol (5.6%). The major sesquiterpenes identified were  $\beta$ -caryophyllene (14.1%), caryophyllene oxide (8.4%), spathulenol (7.3%) and globulol (2.8%).

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

**REFERENCE ON ESSENTIAL OILS:** Hnawia et al. 2012

**NOTES:** It is unfortunate that this very attractive species cannot be widely grown in subtropical regions but experience has been that plants from the ultramafic soils of New Caledonia are extremely difficult to cultivate.



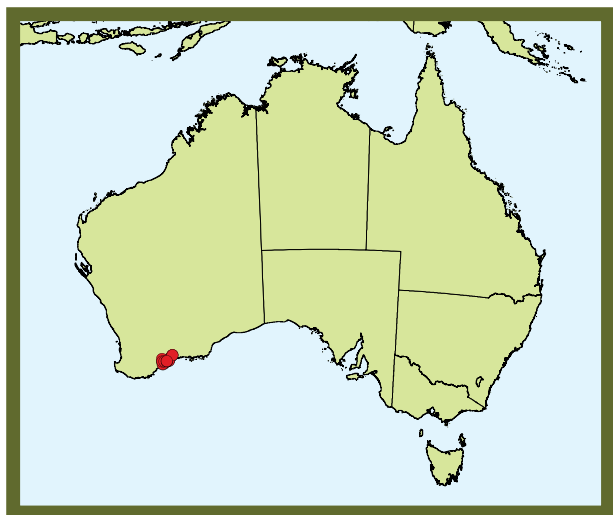
## *Melaleuca papillosa* Turcz. ex Craven



**PUBLICATION:** in Craven & Lepschi, *Australian Systematic Botany* 12: 894 (1999)

**DERIVATION:** *papillosa*, from the Latin *papilla*, nipple, teat, in reference to the papillate leaf surface

**DESCRIPTION:** *Shrub* 0.5–1.2 m tall. *Branchlets* glabrescent, more or less matted sericeous to minutely sericeous or lanuginose-sericeous. *Leaves* alternate, 6.5–14.5 mm long, 1–1.7 mm wide, 5–11.5 times as long as wide, sessile to short-petiolate; blade glabrescent, more or less matted sericeous to lanuginose-sericeous, generally becoming more or less lanuginose-pubescent to lanuginose distally, linear-obovate, linear or narrowly suboblong, subfalcate to falcate, in transverse section depressed obovate, transversely semielliptic to semicircular or transversely elliptic, the base narrowly cuneate to attenuate or parallel (blade width equals petiole width), the apex acuminate or obtuse to rounded, the veins longitudinal, 3, *oil glands* moderately



dense, obscure, more or less in rows to in rows or scattered. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 1–3 triads, up to 18 mm wide. *Hypanthium* hairy, glabrescent or glabrous, 2–3 mm long. *Calyx lobes* abaxially glabrous or hairy, 0.4–1 mm long, scarious in a marginal band 0.1–0.2 mm wide or herbaceous to the margin. *Petals* deciduous, 1.2–2 mm long. *Stamens* 4–7 per bundle; filaments pink, purple, mauve or purplish-mauve, 6–9.7 mm long, the bundle claw 1.4–3.1 mm long, 0.2–0.4 times as long as the filaments. *Style* 6.5–13 mm long. *Ovules* c. 10–20 per locule. *Infructescences* peg-fruited. *Fruit* 3.8–5 mm long, with sepaline teeth (these sometimes weakly developed); cotyledons obovulate.

**NATURAL OCCURRENCE:** Western Australia: the Fitzgerald River district.

**ECOLOGY:** Recorded as occurring in sand plain, heath, mallee heath, on sandy loam, quartz sand, and sandy clay over laterite.

**FLOWERING TIME:** Recorded as flowering in September and October.

**ESSENTIAL OILS:** This species produced a leaf oil that was predominantly sesquiterpenoid in nature; monoterpenes contributed approximately 30% of the oil. The principal monoterpene encountered was  $\alpha$ -pinene (20.5%). This was accompanied by lesser amounts of 1,8-cineole (8.1%), linalool (2.1%),  $\beta$ -pinene, terpinen-4-ol, limonene and  $\alpha$ -terpineol (all <1.5%). The principal sesquiterpenes encountered were E,E-farnesol (19.4%), globulol (7.4%), viridiflorol (6.0%), bicyclogermacrene (4.9%) and cubeban-11-ol (3.2%). The presence of so much E,E-farnesol is unusual in a *Melaleuca* oil.

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

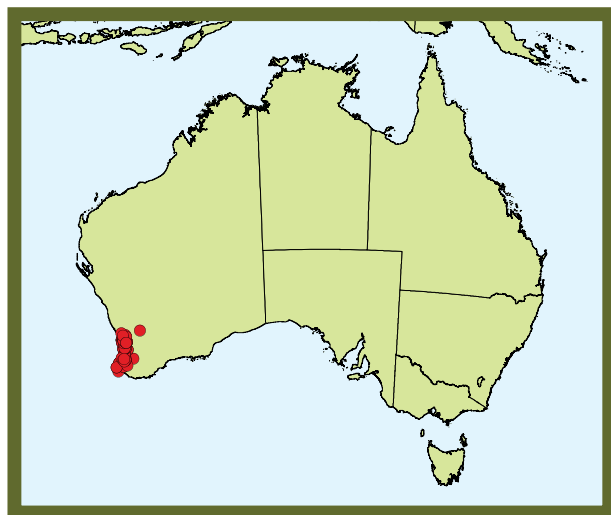


## Melaleuca parviceps Lindl.



**PUBLICATION:** *Edwards's Botanical Register*, Appendix vols 1–23: viii (1839)

**DERIVATION:** *parviceps*, from the Latin *parvus*, little, small, and *-ceps*, from *caput*, head, in reference to the small inflorescences in the type collection



**DESCRIPTION:** *Shrub* 0.3–1.2 m tall. *Branchlets* glabrescent, more or less sericeous. *Leaves* alternate, 7.5–25 mm long, 0.7–1.2 mm wide, 10–27 times as long as wide, subsessile to rarely short-petiolate; blade glabrescent, with more or less sericeous hairs overlaid with longer pubescent hairs, linear to linear-obovate, in transverse section transversely elliptic to transversely narrowly elliptic or rarely depressed obovate or subcircular, the base parallel (blade width equals petiole width), the apex acuminate or acute to obtuse, the veins longitudinal, 3, *oil glands* moderately dense, obscure to distinct, scattered. *Inflorescences* capitate or shortly spicate, pseudoterminal and sometimes also upper axillary, with 2–8 triads, up to 25 mm wide. *Hypanthium* hairy, 1.5–2.5 mm long. *Calyx lobes* abaxially glabrous or very rarely hairy, 0.5–1.5 mm long, scarious throughout. *Petals* caducous, 1.7–3 mm long. *Stamens* 6–10 per bundle; filaments pink, mauve, purple, rose-pink, magenta or mauve-pink, 8–12.5 mm long, the bundle claw 3–5.2 mm long, 0.3–0.5 times as long as the filaments. *Style* 10–14.5 mm long. *Ovules* 15(–20) per locule. *Infructescences* peg-fruited. *Fruit* 2.5–3.5 mm

long, the calyx lobes weathering away or rarely weakly developed sepaline teeth occur (the teeth then being a barely discernible series of undulations around the hypanthium rim); cotyledons obvolvate.

**NATURAL OCCURRENCE:** Western Australia: mainly in the Darling Range district (including the Perth area), with inland occurrences in the Wyalkatchem–Kellerberrin district.

**ECOLOGY:** Recorded as occurring in low scrubland, heathland with mallee, jarrah woodland-forest, swamp flats, open shrubland, on lateritic clay over granite, and sand over granite with quartzite.

**FLOWERING TIME:** Recorded as flowering from August to December.

**ESSENTIAL OILS:** This species gave a predominantly monoterpenoid oil. The principal monoterpene encountered was linalool (41.2%). This was accompanied by lesser amounts of  $\alpha$ -pinene (7.0%),  $\beta$ -pinene (17.0%), limonene (1.6%) and  $\alpha$ -terpineol (1.2%). The main sesquiterpenes encountered were globulol (5.0%), bicyclogermacrene (2.0%), viridiflorol (2.0%), spathulenol (4.3%) and cuban-11-ol (1.3%).

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

**NOTES:** If plants that produce much higher oil yields can be located, this species could be a useful source of linalool.



## Melaleuca parvistaminea Byrnes



**PUBLICATION:** *Austrobaileya* 2: 75 (1984)

**DERIVATION:** *parvistaminea*, from the Latin *parvus*, small, little, and *stamen*, stamen, in reference to the short stamens of this species

**DESCRIPTION:** *Shrub or tree* 1–10 m tall; bark fibrous, grey-brown. *Branchlets* glabrescent, lanuginulose-puberulous to lanuginulose, often with some puberulous or sericeous-lanuginulose hairs also. *Leaves* ternate or rarely alternate, 4–12 mm long, 0.5–1 mm wide, 5–14 times as long as wide, sessile; blade glabrescent, lanuginulose-puberulous to lanuginulose, less often with some puberulous or sericeous-lanuginulose hairs also, linear-elliptic, linear-obovate, linear or rarely very narrowly obovate, in transverse section shallowly lunate to semicircular, the base attenuate, the apex acute to obtuse or obtusely shortly acuminate, the veins longitudinal, 3, *oil glands* moderately dense, distinct to obscure, more or less in rows. *Inflorescences* spicate or capitate, pseudoterminal and sometimes also upper axillary, with 15–50 monads, up to 11 mm wide. *Hypanthium* glabrous

(rarely subglabrous), 1–1.5 mm long. *Calyx lobes* abaxially glabrous, 0.4–0.7 mm long, scarios in a marginal band to 0.3 mm wide or herbaceous to the margin. *Petals* deciduous, 1.5–2 mm long. *Stamens* 3–8 per bundle; filaments cream, 2.3–4.2 mm long, the bundle claw 0.1–0.8 mm long, 0.04–0.2 times as long as the filaments. *Style* 4–5.5 mm long. *Ovules* c. 60–70 per locule. *Fruit* 2.5–3 mm long, the calyx lobes weathering away; cotyledons planoconvex (approaching subobovulate).

**NATURAL OCCURRENCE:** New South Wales, Victoria: from the Shoalhaven River district in New South Wales south and west to the Seymour district in Victoria. Naturalised locally in western Victoria.

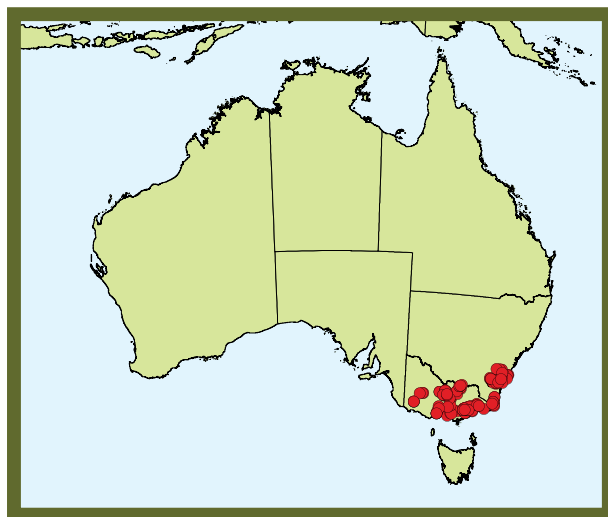
**ECOLOGY:** Recorded as occurring in open forest, dry sclerophyll woodland, grassland, swampy depression, stream flats, open stream and drainage line vegetation, on granite, sandy soil with gravel, and clayey sand over sandstone with some quartzite.

**FLOWERING TIME:** Recorded as flowering from September to December.

**ESSENTIAL OILS:** This species presented a monoterpenic oil. The principal components were 1,8-cineole (68–71%),  $\alpha$ -pinene (6–8%), limonene (7–8%) and  $\alpha$ -terpineol (7–8%). Sesquiterpenes accounted for little of the oil, with globulol (0.4%) and spathulenol (0.4–0.6%) being the principal members.

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

**NOTES:** This species has proved to be hardy in cultivation as an ornamental in temperate regions of Australia. Its pale flowers are not especially attractive but it may be that the species could be used in a hybridisation program aimed at producing frost-hardy plants with flowers in a broad colour range.



## *Melaleuca pauciflora* Turcz.

**PUBLICATION:** *Bulletin de la Société Impériale des Naturalistes de Moscou* 20: 166 (1847)

**DERIVATION:** *pauciflora*, from the Latin *paucus*, few, and *flos*, flower, in reference to the few-flowered inflorescence

**DESCRIPTION:** *Shrub* 0.5–3 m tall. *Branchlets* glabrous. *Leaves* decussate or rarely ternate, 3–12 mm long, 0.9–2 mm wide, 3–8 times as long as wide, subsessile; blade glabrous, very narrowly elliptic or narrowly elliptic, in transverse section sublunate, the base attenuate or cuneate, the apex acute to obtuse, the veins longitudinal, 3–5, *oil glands* dense, distinct, more or less in rows. *Inflorescences* capitate or subcapitate, lateral, with 2–8 monads, up to 6 mm wide. *Hypanthium* glabrous, 0.7–1.4 mm long. *Calyx lobes* abaxially glabrous, 0.5–1 mm long, scarious in a marginal band 0.1 mm wide or herbaceous to the margin. *Petals* deciduous, 1–1.4 mm long. *Stamens* 2–7 per bundle; filaments white or greenish-white, 2.2–2.5 mm long, the bundle claw 1.2–1.5 mm long, 0.5–0.6 times as long as the filaments. *Style* 3–3.3 mm long. *Ovules* 12–25 per locule. *Fruit* 1.5–2 mm long, with sepaline teeth; cotyledons planoconvex.

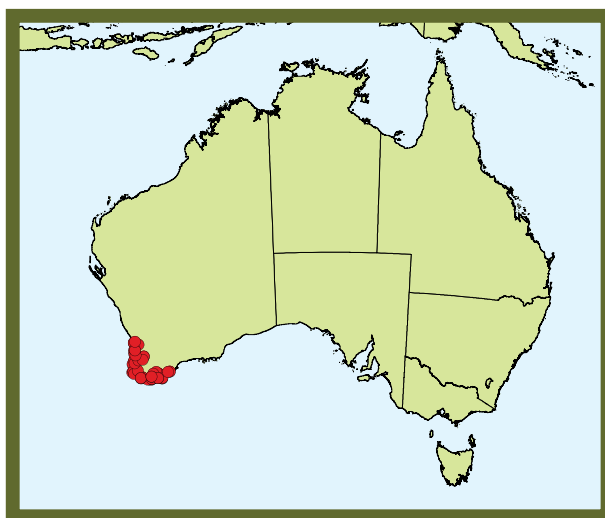
**NATURAL OCCURRENCE:** Western Australia: from the Perth district south to the Augusta and Albany districts.

**ECOLOGY:** Recorded as occurring in closed heathland, open shrubland, swamp flat with sedges and low shrubs, peaty swamp, on sand, sandy loam, and sandy clay over clay.

**FLOWERING TIME:** Recorded as flowering from December to February.

**ESSENTIAL OILS:** This species presented an oil with significant amounts of both mono- and sesquiterpenes. The principal monoterpenes were 1,8-cineole (16.9%), limonene (7.2%) and  $\alpha$ -pinene (3.2%). The major sesquiterpenes were aromadendrene (7.7%), viridiflorene (5.2%),  $\delta$ -cadinene (8.7%), globulol (7.0%) and spathulenol (1.5%).

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



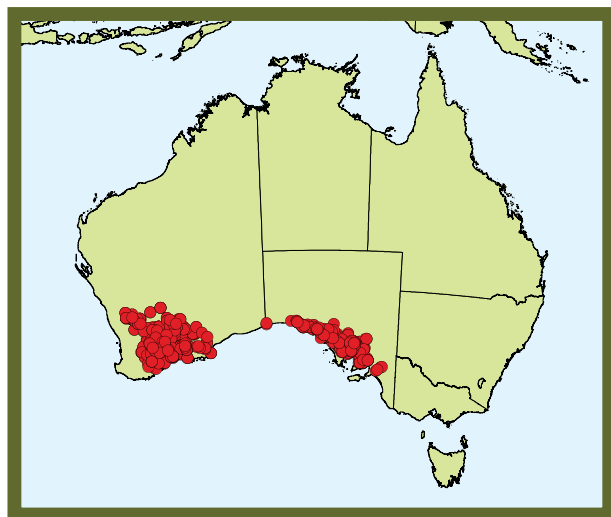


## Melaleuca pauperiflora F.Muell.



**TAXONOMY:** Three subspecies are recognised in this species: subsp. *fastigiata* Barlow, subsp. *mutica* Barlow and subsp. *pauperiflora*

**PUBLICATION:** in Barlow & Cowley, *Australian Systematic Botany* 1: 109, fig. 7d (1988), subsp. *fastigiata*; in Barlow & Cowley, *Australian Systematic Botany* 1: 109, fig. 7e (1988),



subsp. *mutica*; *Fragmenta phytographiae Australiae* 3: 116 (1862), subsp. *pauperiflora*

**DERIVATION:** *fastigiata*, from the Latin *fastigio*, sharpen to a point, hence fastigate, with branches clustered and erect, in reference to the erect, broom-like habit; *mutica*, from the Latin *muticus*, without a point, blunt, in reference to the blunt leaf apex; *pauperiflora*, from the Latin *pauper*, poor, and *flos*, flower, in reference to the few-flowered inflorescence in the first specimens known

**DESCRIPTION:** *Shrub or tree* to 6 m tall; bark fibrous.

**Branchlets** glabrescent, lanuginose-pubescent to pubescent, rarely lanuginulose-puberulous or puberulous.

**Leaves** alternate, 3–13 mm long, 0.8–1.7 mm wide, 2.5–13 times as long as wide, short-petiolate to sessile; blade glabrescent, lanuginulose, lanuginulose-puberulous and/or lanuginose-pubescent, linear-elliptic, very narrowly elliptic, linear-ovate, narrowly triangular, suboblong or narrowly ovate, in transverse section depressed obovate, transversely elliptic, semicircular, semitransversely broadly elliptic, transversely oblong, flattened transversely semielliptic or subcircular, the base attenuate, cuneate or rounded, the apex acuminate, obtusely shortly acuminate

or narrowly acute to obtuse, the veins longitudinal, 3(–5), **oil glands** moderately dense, obscure, in rows (between the veins). **Inflorescences** capitate, pseudoterminal and sometimes also upper axillary, with 3–10 monads, up to 18 mm wide. **Hypanthium** glabrous or hairy, 1.7–2.9 mm long. **Calyx lobes** abaxially glabrous to glabrescent, 0.5–1.3 mm long, scarious in a marginal band 0.1–0.3 mm wide. **Petals** deciduous, 1.7–3 mm long. **Stamens** 10–18 per bundle; filaments white, cream, creamy-white or pale yellow, sometimes ageing to pinkish, 3–7 mm long, the bundle claw 0.9–2.3 mm long, 0.2–0.4 times as long as the filaments. **Style** 5–8.8 mm long. **Ovules** 30–60 per locule. **Fruit** 3–5.3 mm long, the calyx lobes weathering away or rarely forming weakly developed sepaline teeth; cotyledons flattened planoconvex to planoconvex.

**NATURAL OCCURRENCE:** **subsp. fastigiata:** Western Australia: from the Wubin district south and eastwards to the Kulin and Esperance–Norseman districts. **subsp. mutica:** South Australia: from the Nullarbor Plain eastwards to the Murray Bridge district. **subsp. pauperiflora:** Western Australia: from the South Yilgarn district south and eastwards to the Ongerup and Salmon Gums districts.

**ECOLOGY:** **subsp. fastigiata:** Recorded as occurring in disturbed shrubland, open eucalypt forest with *Melaleuca* understorey, low open woodland, dense eucalypt woodland with shrubby understorey, regenerating mallee, on rocky loam, clayey sand over limestone, sandy loam over granite, calcareous clayey loam, alkali lake soil, and saline depression. **subsp. mutica:** Recorded as occurring in open mallee woodland, low dunes, on sandy soil, and calcareous clay. **subsp. pauperiflora:** Recorded as occurring in mallee, eucalypt woodland with *Melaleuca* understorey, mixed open shrub mallee, swampy depressions, tall shrubland, on shallow clay loam, sandy silt, clayey sand, loam, sand, calcareous loam, sand over laterite, and limestone.

**FLOWERING TIME:** **subsp. fastigiata:** Recorded as flowering in July and from September to December. **subsp. mutica:** Recorded as flowering from September to November. **subsp. pauperiflora:** Recorded as flowering from August to November.

**ESSENTIAL OILS:** **subsp. fastigiata:** The leaf oil of this subspecies contained major amounts of monoterpenes, mostly based on the pinene skeleton. The principal components detected were 1,8-cineole (25.8%),  $\beta$ -pinene (10.0%) and

trans-pinocarveol (10.5%). These were accompanied by lesser amounts of  $\alpha$ -pinene (7.0%), pinocarpone (4.6%), myrtenal (7.8%), trans-menth-1,5-dien-8-ol (4.1%) and myrtenol (5.2%). Sesquiterpenes were neither numerous nor plentiful, with the major contributors being elemol (1.6%), spathulenol (0.6%) and several unidentified oxygenated sesquiterpenes totalling 5%. **subsp. mutica:** This subspecies presented a monoterpenoid oil with sesquiterpenes contributing little to the overall oil. The principal components were 1,8-cineole (22–35%),  $\alpha$ -pinene (7–14%) and  $\beta$ -pinene (11–19%). There were also lesser amounts of limonene (1–2%), myrtenal (4–6%), trans-pinocarveol (7–10%), pinocarpone (3–4%), verbenone (1–3%), myrtenol (3–5%) and  $\alpha$ -terpineol (1–3%). The main sesquiterpenes encountered were globulol (1–2%) and caryophyllene oxide (1–2%). **subsp. pauperiflora:** The leaf oil of this subspecies was dominated by monoterpenes. The principal monoterpenes were 1,8-cineole (44.4%) and  $\alpha$ -pinene (12.9%). These were accompanied by lesser amounts of limonene (5.9%),  $\beta$ -pinene (1.3%), terpinen-4-ol (1.4%) and  $\alpha$ -terpineol (5.8%). Sesquiterpenes, while numerous, did not contribute much to the oil. The major sesquiterpenes were spathulenol (7.3%), globulol (2.7%) and viridiflorol (1.4%).

**OIL YIELD:** **subsp. fastigiata:** The oil yield (fresh weight, w/w) was 0.1%. **subsp. mutica:** The oil yield (fresh weight, w/w) was 0.3–0.6%. **subsp. pauperiflora:** The oil yield (fresh weight, w/w) was 0.2%.

**NOTES:** The three subspecies are distinguished as follows: **subsp. fastigiata:** Leaf blade at the apex acuminate, obtusely shortly acuminate, narrowly acute, acute or obtuse, often mucronulate to mucronate; staminal filaments 3–5 mm long; calyx lobes 0.5–0.8 mm long; fruit 2.6–4.5 mm wide. **subsp. mutica:** Leaf blade at the apex obtuse, rounded, rarely obtusely shortly acuminate or acute, not mucronulate or mucronate. **subsp. pauperiflora:** Leaf blade at the apex acuminate, obtusely shortly acuminate, narrowly acute, acute or obtuse, often mucronulate to mucronate; staminal filaments 5.4–7 mm long; calyx lobes 0.6–1.3 mm long; fruit 4–6.1 mm wide.

The species is very widespread and occurs on a diversity of soil types. It should therefore be possible to select taller genotypes that might be suitable for shelter-belt plantings etc. in dry temperate regions.

## Melaleuca pearsonii (R.D.Spencer & Lumley) Craven



**PUBLICATION:** *Novon* 16: 473 (2006)

**DERIVATION:** *pearsonii*, in honour of Steven Pearson, a former ranger with the then Queensland National Parks and Wildlife Service at Blackdown Tableland, where this species occurs

**SYNONYM:** *Callistemon pearsonii* R.D.Spencer & Lumley

**DESCRIPTION:** *Shrub* 0.4–2 m tall; bark, fibrous, hard. *Branchlets* glabrescent, sericeous-pubescent. *Leaves* alternate, 14–38 mm long, 1.5–3 mm wide, 7–18 times as long as wide, short-petiolate; blade glabrescent, sericeous-pubescent, sometimes matted, linear-obovate, narrowly elliptic or very narrowly elliptic, in transverse section transversely linear or sublunate, the base very narrowly cuneate, very narrowly attenuate or parallel (blade width equals petiole width), the apex very shortly acuminate, the veins longitudinal-pinnate, the primary veins obscure, 3 longitudinal veins, *oil glands* moderately dense or sparse, distinct or obscure, scattered. *Inflorescences* spicate or subcapitate, with 20–40 monads, 45–65 mm wide. *Hypanthium* glabrous, 3–3.9 mm long. *Calyx lobes* abaxially hairy (with

cilia on the margin only), 1.4–2.5 mm long, scarious in a marginal band 0.2–0.6 mm wide. *Petals* deciduous, 3.7–5.7 mm long. *Stamens* 25–39 per flower; filaments red, 17–24 mm long; anthers yellow. *Style* 19–31 mm long. *Ovules* c. 100–200 per locule. *Fruit* 3.8–5.2 mm long, the calyx lobes deciduous or very rarely persistent; cotyledons obvolute or concavoconvex.

**NATURAL OCCURRENCE:** Queensland: the Blackdown Tableland.

**ECOLOGY:** Recorded as occurring in gully heathland, crevices in sloping rock on stream bank, open eucalypt forest – wallum vegetation in creek bed, on wet peaty soil, and sandstone.

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

**ESSENTIAL OILS:** 1,8-cineole (43–65%) was the principal component of this predominantly monoterpenoid oil. This was accompanied by lesser amounts of  $\alpha$ -pinene (2–11%), limonene (0.5–4.0%) and  $\alpha$ -terpineol (7–9%). Of the sesquiterpenes, the principal components were  $\beta$ -caryophyllene (1–3%), spathulenol (2–6%), globulol (0.9–7.0%), viridiflorol (0.5–6.0%) and cubeban-11-ol (0.3–3.0%).

**OIL YIELD:** The oil yield (fresh weight, w/w) was 0.1–0.3%.

**REFERENCE ON ESSENTIAL OILS:** Brophy et al. 1998, as *Callistemon pearsonii*

**NOTES:** Although this bottlebrush species occurs in quite a northerly locality in Australia, it is recorded by Wrigley and Fagg (1993) as being frost hardy; possibly this is because it naturally occurs on a moderately high tableland.





## *Melaleuca penicula* (K.J.Cowley) Craven



**PUBLICATION:** in Craven & Lepschi, *Australian Systematic Botany* 12: 896 (1999)

**DERIVATION:** *penicula*, from the Latin *penicillum*, little tail, painter's brush, in reference to the brush-like appearance of the staminal claw and filaments

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

**DESCRIPTION:** *Shrub* to 2.5 m tall. *Branchlets* glabrescent, lanuginose-pubescent to pubescent. *Leaves* decussate, petate, 5.5–10.3 mm long, 2–3.25 mm wide, 2.7–3.8 times as long as wide, sessile; blade glabrescent, pubescent to lanuginose-pubescent, narrowly ovate, in transverse section broadly v-shaped, the base truncate, the apex acute, the veins longitudinal, 9–13, *oil glands* moderately dense to sparse, distinct, scattered. *Inflorescences* spicate,

with c. 40 triads, up to 60 mm wide. *Hypanthium* hairy, 2–3.2 mm long. *Calyx lobes* abaxially hairy or rarely glabrescent, costate, 1.2–1.8 mm long, scarious in a marginal band to 0.2 mm wide. *Petals* caducous, 3–3.5 mm long. *Stamens* 10–14 per bundle; filaments red, 17.8–20 mm long, the bundle claw 9.5–12.5 mm long, 0.5–0.7 times as long as the filaments. *Style* c. 22–24 mm long. *Ovules* c. 80–110 per locule. *Fruit* 4.5–5 mm long, the calyx lobes weathering away or sepaline teeth present; cotyledons subobovulate (almost planoconvex).

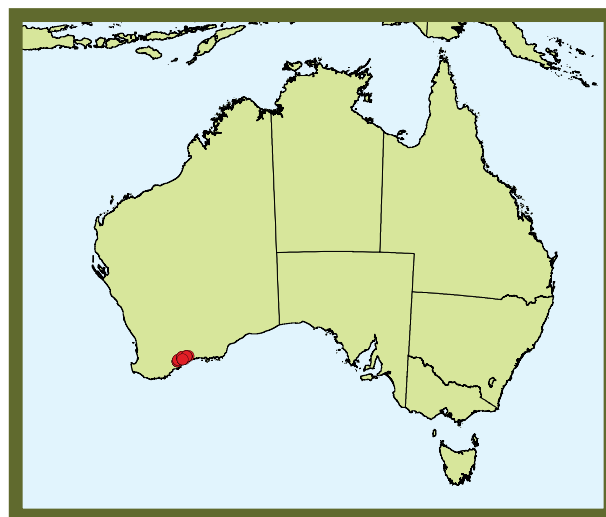
**NATURAL OCCURRENCE:** Western Australia: the Fitzgerald River district.

**ECOLOGY:** Recorded as occurring in mallee shrubland, *Casuarina*–*Melaleuca* shrubland, in low open heath as an emergent shrub, on sand over granite, on a thin layer of white sand over red clay over granite, and on dark brown calcrete soil over calcrete.

**FLOWERING TIME:** Recorded as flowering in February.

**ESSENTIAL OILS:** The leaf oil of this species contained significant amounts of both mono- and sesquiterpenes. The principal monoterpene was  $\alpha$ -pinene (18.8%). This was accompanied by lesser amounts of 1,8-cineole (9.1%), trans-pinocarveol (2.3%),  $\alpha$ -terpineol (2.5%) and pinocarvone (1.0%). The principal sesquiterpenes were  $\alpha$ -eudesmol (9.6%),  $\beta$ -eudesmol (21%),  $\gamma$ -eudesmol (16.4%), elemol (1.8%) and cubeban-11-ol (2%).

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



## Melaleuca pentagona Labill.



**TAXONOMY:** Three varieties are recognised in this species: var. *latifolia* Benth., var. *pentagona* and var. *raggedensis* Craven

**PUBLICATION:** *Flora Australiensis* 3: 152 (1867), var. *latifolia*; *Novae Hollandiae plantarum specimen* 2: 27, t. 166 (1806), var. *pentagona*; in Craven & Lepschi, *Australian Systematic Botany* 12: 897 (1999), var. *raggedensis*

**DERIVATION:** *latifolia*, from the Latin, *latus*, wide, and *folium*, leaf, in reference to the leaves in this variety being wider than those in var. *pentagona*; *pentagona*, from the Greek, *pente*, five, and *gonio*, angle, corner, in reference to each fruiting hypanthium being compressed into a five-angled shape; *raggedensis*, from the name of the locality Mt Ragged, Western Australia

**DESCRIPTION:** *Shrub* 0.2–5 m tall; bark papery white-grey. *Branchlets* glabrescent, sericeous, occasionally to more or less sericeous-pubescent or sericeous-pubescent to pubescent. *Leaves* alternate, (5.5–)8–18 mm long, 0.8–5.2 mm wide, 3–18 times as long as wide, sessile to short-petiolate; blade glabrescent, sericeous or occasionally

more or less sericeous-pubescent or sericeous-pubescent to pubescent, linear, linear-obovate, very narrowly obovate, narrowly elliptic, very narrowly elliptic or linear-elliptic, in transverse section transversely semielliptic to semicircular, transversely elliptic to circular or transversely narrowly oblong to transversely linear (juvenile leaves strongly channelled abaxially with up to 3 grooves present; adult leaves smooth abaxially usually with a single deep median groove), the base truncate, parallel (blade width equals petiole width) or narrowly cuneate to attenuate, the apex acuminate, the veins longitudinal, 3, *oil glands* moderately dense, obscure, in rows to scattered (dependent largely on the width of the leaf). *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary and/or lateral, with 3–8 triads, up to 20 mm wide. *Hypanthium* glabrous, 1–1.8 mm long. *Calyx lobes* abaxially glabrous or sometimes hairy, 0.2–0.5 mm long, scarious throughout or scarious in a marginal band c. 0.2 mm wide. *Petals* caducous, 0.9–2 mm long. *Stamens* 2–8 per bundle; filaments mauve, pink, purple or magenta, apparently



sometimes ageing to whitish, 4.3–9 mm long, the bundle claw 0.6–2.8 mm long, 0.1–0.4 times as long as the filaments. **Style** 6–7.5 mm long. **Ovules** 5–8 per locule. **Infructescences** globose. **Fruit** 2.5–3.5 mm long, the calyx lobes weathering away; cotyledons obvolvate to subobvolvate (almost planoconvex).

**NATURAL OCCURRENCE:** **var. latifolia:** Western Australia: the Esperance – Israelite Bay – Toolinna district. **var. pentagona:** Western Australia: from the Mount Barker – Albany district to the Esperance district. **var. raggedensis:** Western Australia: the Mt Ragged district.

**ECOLOGY:** **var. latifolia:** Recorded as occurring in open heathland, mallee, open shrub mallee, on sand, sandy loam, sandy granitic soil, and edges of salt lake. **var. pentagona:** Recorded as occurring in coastal heathland, heath with shrubs, sand plain, open mallee woodland, mallee–*Melaleuca* woodland, on limestone soil with sand, sandy clay over clay, sandy clay over greenstone with laterite outcrops, gravelly soil over granite, and sandstone. **var. raggedensis:** Recorded as occurring in heathland, open mallee vegetation, low shrubland, on skeletal sand, among quartzite boulders, granite outcrops, and stony soil.

**FLOWERING TIME:** **var. latifolia:** Recorded as flowering in October and November. **var. pentagona:** Recorded as flowering in May and from August to December. **var. raggedensis:** Recorded as flowering from October to January.

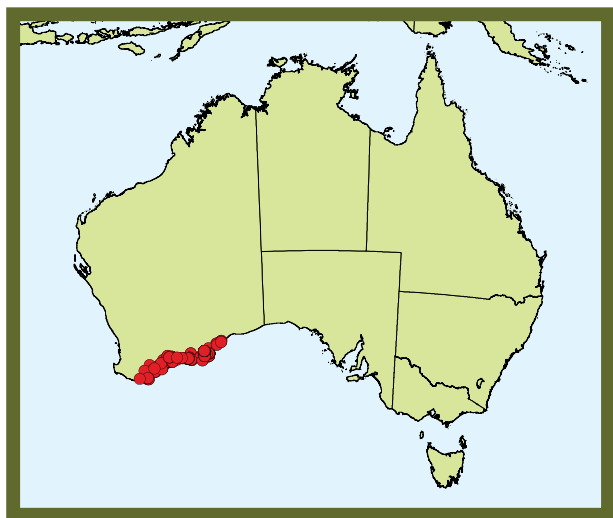
**ESSENTIAL OILS:** **var. latifolia:** The leaf oil from this variety was monoterpenoid in character. The principal components encountered in the oils were myrtenal

(36–59% in LAC 9630 and 9–20% in LAC 9633),  $\alpha$ -pinene (10–36% in LAC 9630 and 10–18% in LAC 9633), 1,8-cineole (5–21% in LAC 9630 and 29–45% in LAC 9633). Other significant compounds identified were myrtenyl acetate (8–26% in LAC 9633), myrtenal (1–5%),  $\alpha$ -terpineol (1–3%) and limonene (1–4%). Sesquiterpenes were not prominent compounds in the oils of this variety, with globulol (0.1–0.8%) and spathulenol (0.2–0.9%) being the most prominent components. **var. pentagona:** This variety gave an overwhelmingly monoterpenoid oil. The principal component was 1,8-cineole (63.8%). This was accompanied by lesser amounts of methyl myrtenate (10.4%), myrtenal (6.9%), linalool (3.1%) and limonene (2.7%). Sesquiterpenes contributed very little to this oil, with the major components being spathulenol (0.6%), globulol (0.5%) and bicyclogermacrene (0.4%). **var. raggedensis:** This variety also gave an overwhelmingly monoterpenoid oil. The principal components were 1,8-cineole (38.1%) and myrtenal (37.2%). These were accompanied by lesser amounts of methyl myrtenate (6.7%),  $\alpha$ -terpineol (3.0%), limonene (2.6%),  $\alpha$ -pinene (3.0%) and myrtenol (1.2%). Sesquiterpenes, once again, contributed very little to this oil, with the major components being spathulenol (0.6%), globulol (0.2%) and bicyclogermacrene (0.1%). Qualitatively, this oil was similar to the oil of **var. pentagona**.

**OIL YIELD:** **var. latifolia:** The oil yield (fresh weight, w/w) was 0.6–1.1% for LAC 9630 and 0.3–0.6% for LAC 9633. **var. pentagona:** The oil yield (dry weight, w/w) was 0.4%. **var. raggedensis:** The oil yield (dry weight, w/w) was 1.5%.

**NOTES:** The three varieties are distinguished as follows: **var. latifolia:** Adult leaves in transverse section transversely linear. **var. pentagona:** Adult leaves in transverse section circular to transversely elliptic (rarely transversely narrowly elliptic or depressed obovate); stamens 2–5 per bundle; hypanthium 1–1.6 mm long; ovules 5–8 per locule (usually 5). **var. raggedensis:** Adult leaves in transverse section circular to transversely elliptic (rarely transversely narrowly elliptic or depressed obovate); stamens 4–7 per bundle; hypanthium 1.5–2 mm long; ovules 5–10 per locule (usually 8–10). The distinctive single abaxial median groove that is characteristic of **var. pentagona** occurs occasionally in **var. raggedensis** also.

The variety **pentagona** is regarded as a reliable ornamental shrub in temperate Australia.





## Melaleuca phoenicea (Lindl.) Craven



**PUBLICATION:** *Novon* 16: 473 (2006)

**DERIVATION:** *phoenicea*, from the Latin *phoeniceus*, bright red, scarlet, in reference to the colour of the staminal filaments

**SYNONYM:** *Callistemon phoeniceus* Lindl.

**DESCRIPTION:** *Shrub or tree* 1–6.5 m tall. *Branchlets* glabrescent, pubescent or sericeous-pubescent. *Leaves* alternate, 31–114 mm long, 3–10 mm wide, 4–40 times as long as wide, short-petiolate or sessile; blade glabrescent, sericeous to sericeous-pubescent, linear-obovate, linear-elliptic, narrowly obovate or narrowly elliptic, in transverse section transversely linear, the base very narrowly cuneate, the apex shortly acuminate or obtusely shortly acuminate, the veins pinnate, 11–18, *oil glands* dense or moderately dense, distinct, scattered. *Inflorescences* spicate, interstitial, with 15–55 monads, 50–65 mm wide. *Hypanthium* glabrous

or hairy, 4.3–5 mm long. *Calyx lobes* abaxially hairy (with cilia on the margin only), 1–2.8 mm long, scarious in a marginal band 0.3–1.3 mm wide. *Petals* deciduous, 2.9–7.3 mm long. *Stamens* 39–56 per flower; filaments red or scarlet, 16–25 mm long; anthers red. *Style* 21–32 mm long. *Ovules* c. 200–340 per locule. *Fruit* 4.3–6 mm long, the calyx lobes deciduous; cotyledons concavoconvex.

**NATURAL OCCURRENCE:** Western Australia: the south-western area of Western Australia with scattered occurrences in the adjacent arid zone.

**ECOLOGY:** Recorded as occurring in shrubland on flood plain of small stream, rocky area adjacent to river, drainage channel into saline depression, creek bed, on pale brown sand, and white sand.

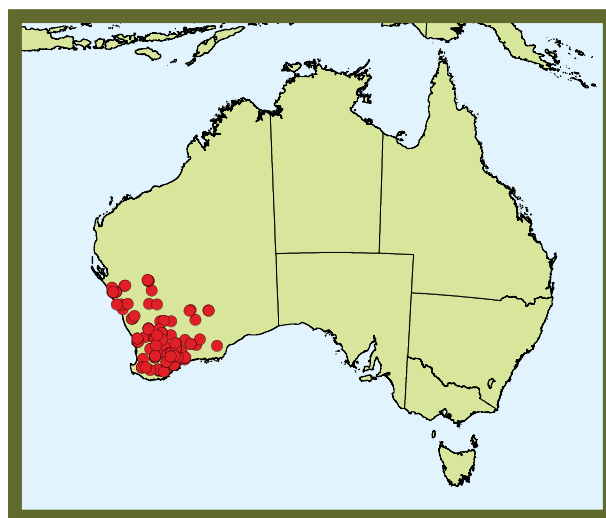
**FLOWERING TIME:** Recorded as flowering from October to January and in May.

**ESSENTIAL OILS:** This species produced an oil dominated by monoterpenes. The principal component was 1,8-cineole (59–74%). This was accompanied by lesser amounts of  $\alpha$ -pinene (1–3%), limonene (3–7%) and  $\alpha$ -terpineol (4–5%). Sesquiterpenes were neither numerous nor plentiful, with the principal members being bicyclogermacrene (0.7–2.0%), globulol (0.7–2.0%) and spathulenol (0.2–2.0%).

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

**REFERENCE ON ESSENTIAL OILS:** Brophy et al. 1998, as *Callistemon phoeniceus*

**NOTES:** *Melaleuca phoenicea* is cultivated as an ornamental shrub in dry to humid temperate regions in Australia and is regarded as being hardy and adaptable.



## *Melaleuca phoidophylla* Barlow ex Craven



**PUBLICATION:** in Craven & Lepschi, *Australian Systematic Botany* 12: 897 (1999)

**DERIVATION:** *phoidophylla*, from the Greek *phois*, blister, and *phyllon*, leaf, in reference to the well-developed tubercles on the leaf surface

**DESCRIPTION:** *Tree or shrub* 0.2–6 m tall. *Branchlets* soon glabrescent, the lanuginulose hairs (together with some occasional lanuginulose-puberulous hairs) ephemeral. *Leaves* ternate (rarely subternate, occasionally approaching alternate), 3–7.6 mm long, 0.9–1.6 mm wide, 2–9 times as long as wide, subsessile to short-petiolate; blade soon glabrescent, the lanuginulose to lanuginulose-puberulous hairs ephemeral, narrowly obovate, very narrowly obovate, linear-obovate, narrowly elliptic, linear-elliptic, suboblong or elliptic, in transverse section depressed obovate, shallowly lunate, transversely semielliptic or

semicircular, the base attenuate or cuneate, the apex obtuse to rounded or acute, the veins longitudinal, 3, *oil glands* moderately dense, distinct to obscure, more or less in rows. *Inflorescences* capitate, pseudoterminal, with 3–18 monads, up to 15 mm wide. *Hypanthium* glabrous, 1.5–2.5 mm long. *Calyx lobes* abaxially glabrous, 0.5–1 mm long, herbaceous to the margin. *Petals* deciduous, 1.3–2 mm long. *Stamens* 7–11 per bundle; filaments cream, white or pinkish-white, 3.5–6 mm long, the bundle claw 0.6–1.4 mm long, 0.1–0.3 times as long as the filaments. *Style* 5–8.5 mm long. *Ovules* 30–45 per locule. *Fruit* 1.8–3 mm long, with sepaline teeth (eventually weathering away); cotyledons planoconvex (approaching subobovulate).

**NATURAL OCCURRENCE:** Western Australia: from the Katanning district eastwards to the Boorabbin district and south to the Salmon Gums district.

**ECOLOGY:** Recorded as occurring in open shrub mallee, heathland and mallee woodland, woodland with *Melaleuca* understorey, shrubland, on the shoreline of a freshwater lake, in sand over sandy clay, clay loam, lateritic sand, and sandy clay over granite.

**FLOWERING TIME:** Recorded as flowering from September to November.

**ESSENTIAL OILS:** The leaf oil of this species was dominated by monoterpenes. The principal components were 1,8-cineole (17–48%) and  $\alpha$ -pinene (18–31%). These were accompanied by lesser amounts of  $\beta$ -pinene (1–5%), limonene (3–5%) and  $\alpha$ -terpineol (1–3%). The principal sesquiterpenes were globulol (3–8%), spathulenol (4–8%), viridiflorol (1–3%) and aromadendrene (1–6%).

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





## Melaleuca phratra Craven

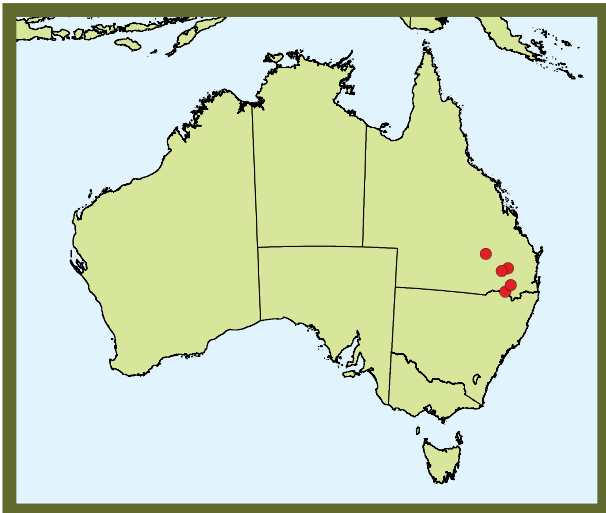


**PUBLICATION:** *Novon* 19: 447 (2009)

**DERIVATION:** *phratra*, from the Greek, *phratra*, clan, brotherhood, in reference to this species being one of a group of putatively closely related species

**SYNONYM:** *Callistemon phratra* (Craven) Udovicic & R.D.Spencer

**DESCRIPTION:** *Shrub or tree* 2–10 m tall; bark fissured, greyish-brown or black. *Branchlets* glabrescent, pubescent to lanuginose-pubescent. *Leaves* alternate, 22–57 mm long, 1.2–5 mm wide, 10–30 times as long as wide, short-petiole; blade glabrescent, sericeous, very narrowly elliptic or narrowly elliptic, in transverse section transversely linear or sublunate, the base very narrowly attenuate or very narrowly cuneate, the apex acute or very shortly acuminate,



the veins pinnate, 13–24. *Inflorescences* spicate, pseudoterminal or interstitial, with 10–30 monads, 25–30 mm wide. *Hypanthium* hairy or glabrescent, 1.7–2.8 mm long. *Calyx lobes* abaxially hairy or glabrescent (sometimes with cilia on the margin only), 0.5–1.2 mm long, herbaceous to the margin. *Petals* deciduous, 2–3.8 mm long. *Stamens* 47–72 per flower; filaments pinkish-red, pink or creamy-pale pink, 7–11 mm long; anthers yellow. *Style* 12–15 mm long. *Ovules* c. 100–150 per locule. *Fruit* 3.1–3.7 mm long, the calyx lobes deciduous; cotyledons obvolute.

**NATURAL OCCURRENCE:** Queensland: the Injune district to the Texas district.

**ECOLOGY:** Recorded as occurring in shrubland on creek banks, and on limestone.

**FLOWERING TIME:** Recorded as flowering from November to February.

**ESSENTIAL OILS:** In the only samples of this species examined (one sample from a single plant and one bulk sample from the same population at Wilgavale, near Texas, Queensland), no oil was extracted.

**OIL YIELD:** The oil yield (fresh weight, w/w) was nil.

**NOTES:** This is one of several species in south-eastern Queensland and north-eastern New South Wales that putatively are closely related to *M. paludicola*, the other two species being *M. quercina* and *M. sabrina*.

Although the stamens are not long, the flowers of this species are an attractive shade of pink and the species is worth trialling as an ornamental shrub in subtropical to warm temperate regions.



## *Melaleuca pityoides* (F.Muell.) Craven



**PUBLICATION:** *Novon* 16: 473 (2006)

**DERIVATION:** *pityoides*, from the Greek *pitys*, pine, and *-oides*, resembling, in reference to a perceived similarity between the foliage of this species and that of a species of pine

**SYNONYM:** *Callistemon pityoides* F.Muell.

**DESCRIPTION:** *Shrub* 0.6–3 m tall; bark hard, grey or black. *Branchlets* glabrescent, sericeous to puberulous overlaid with sparse velutinous hairs. *Leaves* alternate, 12–24 mm long, 0.5–2.5 mm wide, 7.5–30 times as long as wide, short- or long-petiolate; blade glabrescent, sericeous to lanuginose-pubescent, very narrowly ovate, very narrowly elliptic, linear-ovate or linear-elliptic, in transverse section transversely broadly elliptic to transversely linear or sublunate, the base very narrowly attenuate, very narrowly cuneate or parallel (blade width equals petiole width), the apex acute or very shortly acuminate, the veins longitudinal or obscurely pinnate, with 1–3 veins when longitudinal, *oil glands* sparse, obscure, scattered. *Inflorescences* spicate, pseudoterminal, with 10–55 monads, 18–28 mm wide.

*Hypanthium* glabrous, hairy or glabrescent, 2.5–3.7 mm long. *Calyx lobes* abaxially hairy, 0.6–1.2 mm long, herbaceous to the margin. *Petals* deciduous, 2.1–3.4 mm long. *Stamens* 32–52 per flower; filaments yellow-green, cream, pale yellow or yellowish-cream, 6–7 mm long. *Style* 8–12 mm long. *Ovules* c. 80–150 per locule. *Fruit* 3.2–5.1 mm long, the calyx lobes deciduous; cotyledons planoconvex.

**NATURAL OCCURRENCE:** Queensland, New South Wales, Victoria: upland country in the border ranges area of Queensland, the Northern, Central and Southern Tablelands of New South Wales and eastern Victoria.

**ECOLOGY:** Recorded as occurring in swampy heath among snow gums, beside creek on alpine plain, swampy high altitude river flat, closed heathland, low open shrubland, *Sphagnum* swamp, on dark peaty soil, and sandy soil.

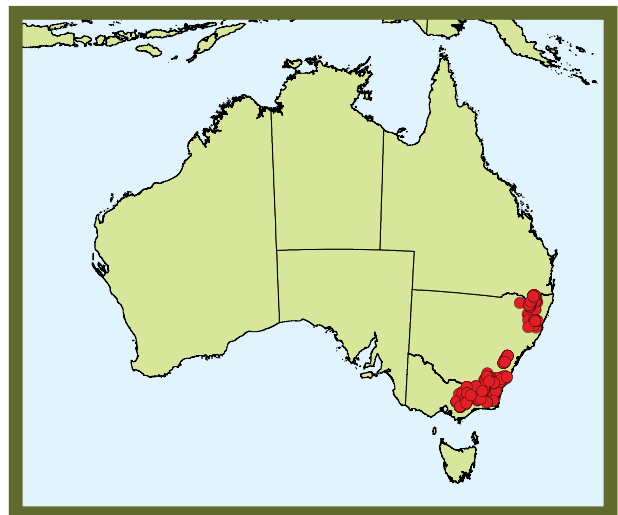
**FLOWERING TIME:** Recorded as flowering from October to February.

**ESSENTIAL OILS:** 1,8-cineole (52–63%) was the major component in this mostly monoterpenoid oil. This compound was accompanied by lesser amounts of  $\alpha$ -pinene (4–8%),  $\beta$ -pinene (2–5%), limonene (7–9%) and  $\alpha$ -terpineol (8–12%). The principal sesquiterpenes, present in significant numbers but not quantity, were globulol (0.5–2.0%), viridiflorol (0.2–0.9%) and spathulenol (0.8–2.0%).

**OIL YIELD:** The oil yield (fresh weight, w/w) was 0.3–0.4%.

**REFERENCE ON ESSENTIAL OILS:** Brophy et al. 1998, as *Callistemon pityoides*

**NOTES:** This bottlebrush species is quite frost hardy and can therefore be grown in reasonably cold regions. The flower colour is not outstanding but there is good potential for a hybridisation program, involving hardy forms of red- or pink-flowered species, to combine cold tolerance with red or pink flowers.



## Melaleuca platycalyx Diels & Pritzel



**PUBLICATION:** *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 35: 426 (1904)

**DERIVATION:** *platycalyx*, from the Greek *platys*, broad, wide, level, and *kalyx*, calyx, apparently in reference to the hypanthium ('calyx tube') being broad towards the apex

**DESCRIPTION:** *Shrub* 0.4–1.5 m tall. *Branchlets* soon glabrescent, the lanuginulose to lanuginulose-puberulous or rarely puberulous hairs ephemeral. *Leaves* decussate, 5–10.4 mm long, 2.4–5.5 mm wide, 1.7–3 times as long as wide, subsessile to short-petiolate; blade soon glabrescent, the lanuginulose to lanuginulose-puberulous or rarely puberulous hairs ephemeral, elliptic, in transverse section transversely linear, the base attenuate or rounded, the apex acute, the veins longitudinal-pinnate, 3 longitudinal veins, *oil glands* moderately dense, distinct to rarely obscure,

scattered to more or less in rows. *Inflorescences* spicate or subspicate, interstitial, with 2–4 monads, up to 16 mm wide. *Hypanthium* glabrescent, 2–3.5 mm long. *Calyx lobes* abaxially glabrous, 0.6–1.3 mm long, scarious in a marginal band 0.2–0.3 mm wide. *Petals* deciduous, 3–4 mm long. *Stamens* 25–36 per bundle; filaments mauve, purple or pink, 4.3–6.5 mm long, the bundle claw 0.5–1.5 mm long, 0.1–0.3 times as long as the filaments. *Style* 6.5–7.5 mm long. *Ovules* c. 150–200 per locule. *Fruit* 4–5.6 mm long, with sepaline teeth (these eventually weathering); cotyledons planoconvex.

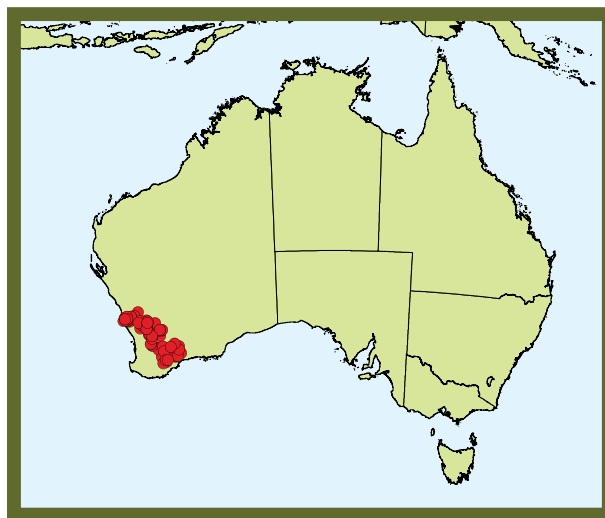
**NATURAL OCCURRENCE:** Western Australia: from the Latham district south and eastwards to the Ongerup and Lake King districts.

**ECOLOGY:** Recorded as occurring in high shrubland mallee with dense understorey, open eucalypt forest with tall *Melaleuca* understorey and low shrubs, edge of open sedgeland, low open heath, dense heathland, on sand, granite soil, sandy clay over laterite, sandy laterite, and sandy loam over weathering sandstone.

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

**ESSENTIAL OILS:** The leaf oil of this species was dominated by monoterpenes. The principal components were 1,8-cineole (65.3%),  $\alpha$ -pinene (7.6%), limonene (5.0%), terpinen-4-ol (0.8%) and  $\alpha$ -terpineol (4.1%). The principal sesquiterpenes found in the oil were globulol (4.3%) and spathulenol (1.2%). No other sesquiterpene contributed more than 0.3% of the total oil.

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



## *Melaleuca plumea* Craven



**PUBLICATION:** in Craven & Lepschi, *Australian Systematic Botany* 12: 897 (1999)

**DERIVATION:** *plumea*, from the Latin *plumeus*, downy, hence feathery or fluffy, in reference to the bracts subtending the inflorescences being fluffy

**DESCRIPTION:** *Shrub* 0.3–2.1 m tall. *Branchlets* glabrescent, pubescent. *Leaves* alternate, 4.5–10.5 mm long, 1–2.2 mm wide, 2.7–10 times as long as wide, subsessile to short-petiolate; blade glabrescent, sericeous-pubescent to pubescent, linear, narrowly oblong, very narrowly obovate, linear-obovate or obovate, in transverse section transversely elliptic, depressed obovate or semicircular, the base narrowly cuneate or rounded, the apex obtusely shortly acuminate, rounded to obtuse or acuminate, the veins longitudinal, 3, *oil glands* moderately dense or dense, obscure, more or less in rows to in rows. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 1–5 triads, up to 17 mm wide. *Hypanthium* hairy, 1.5–2 mm long. *Calyx lobes* abaxially hairy, 0.4–1 mm long, scarious throughout or sometimes herbaceous to the margin (occasionally the proximal portion may be weakly herbaceous with an ill-defined hyaline margin 0.1–0.5 mm wide). *Petals* deciduous (rarely caducous), 1.1–1.8 mm long. *Stamens* 5–8 per bundle; filaments purple, mauve, pink, bright deep pink, mauve or magenta, 5–9 mm long,

the bundle claw 1–2.6 mm long, 0.1–0.3 times as long as the filaments. *Style* 6.5–8 mm long. *Ovules* 10–20 per locule.

*Infructescences* peg-fruited. *Fruit* 2.5–3.5 mm long, the calyx lobes weathering away (very rarely some barely visible undulations may occur around the hypanthium rim); cotyledons subobovate (almost planoconvex) to obovate.

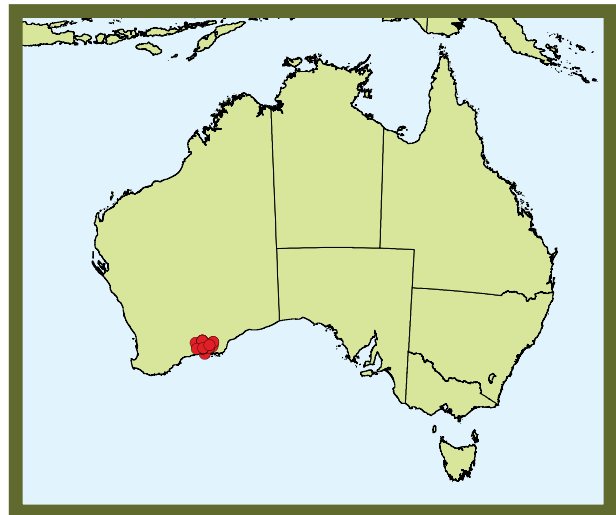
**NATURAL OCCURRENCE:** Western Australia: the Salmon Gums – Scaddan – Mt Beaumont district.

**ECOLOGY:** Recorded as occurring in open shrub mallee, sand plain, low heath and open low scrub, mallee heath, on sand, sand over clay subsoil, and gravelly sand over gravelly clay.

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

**ESSENTIAL OILS:** The leaf oil of this species was dominated by monoterpenes. The principal component was 1,8-cineole (44–58%) and this was accompanied by lesser amounts of  $\alpha$ -pinene (8–18%),  $\beta$ -pinene (10–16%), limonene (1–4%), trans-pinocarveol (1–3%), myrtenal (0.7–12.0%) and  $\alpha$ -terpineol (3–5%). A second collection (LAC 9096) contained a similar oil, though there was substantially more  $\alpha$ -pinene (12–38%) and  $\beta$ -pinene (7–22%) and less 1,8-cineole (7–35%). The principal sesquiterpenes, many of which were present in very small amounts, were globulol (0.3–0.9%), viridiflorol (0.2–0.4%) and spathule-nol (0.3–0.7%).

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





## Melaleuca podiocarpa Barlow ex Craven



**PUBLICATION:** in Craven & Lepschi, *Australian Systematic Botany* 12: 898 (1999)

**DERIVATION:** *podiocarpa*, from the Greek *podos*, foot, and *karpos*, fruit, in reference to the stout, foot-like structure into which the inflorescence axis develops during fruit development

**DESCRIPTION:** *Shrub* 0.7–2.4 m tall; bark papery. *Branchlets* glabrescent or rarely glabrous, pubescent. *Leaves* alternate, 4.5–14 mm long, 1.5–6 mm wide, 2–4 times as long as wide, sessile; blade glabrescent or rarely glabrous, the indumentum generally of marginal cilia only, rarely also pubescent to more or less sericeous-pubescent, elliptic to narrowly elliptic or narrowly ovate to ovate, in transverse section lunate or shallowly lunate, the base cuneate, truncate, attenuate or rounded, the apex acuminate, the veins longitudinal, 5–9, *oil glands* moderately dense, distinct, in rows to more or less in rows. *Inflorescences* capitate

or subcapitate, lateral, with 1–3 monads. *Hypanthium* hairy, 3–4 mm long. *Calyx lobes* abaxially hairy or rarely glabrescent, costate, 1.5–1.8 mm long, scarious in a marginal band 0.2–0.5 mm wide. *Petals* deciduous, 4.5–5.5 mm long. *Stamens* 30–45 per bundle; filaments white, 6.5–8 mm long, the bundle claw 4.5–6.5 mm long, 0.7–0.8 times as long as the filaments. *Style* 2–4.5 mm long (more or less level with the mouth of the hypanthium and at the same level as the reflexed stamens). *Ovules* 40–50 per locule. *Fruit* 3.8–7.7 mm long, with sepaline teeth; cotyledons subobovulate (almost planoconvex).

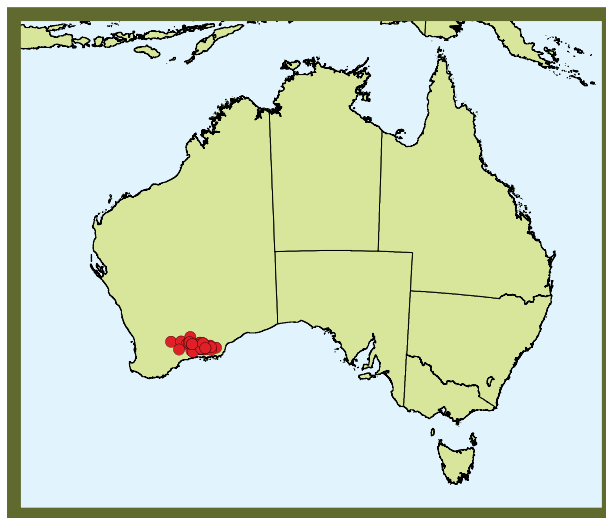
**NATURAL OCCURRENCE:** Western Australia: the Lake King – Grasspatch district.

**ECOLOGY:** Recorded as occurring in open shrub mallee, low heathland, *Melaleuca* shrubland, mallee woodland with *Melaleuca* understorey, eucalypt woodland and mallee heath, on heavy clay soil, sand over clay, sandy soil with laterite, and sandy loam.

**FLOWERING TIME:** Recorded as flowering from October to January.

**ESSENTIAL OILS:** The leaf oil from this species was sesquiterpenoid in nature. The principal components were globulol (15.7%) and viridiflorol (11.8%), with lesser amounts of spathulenol (3.9%),  $\alpha$ -cadinol (3.2%), E,E-farnesol (3.6%), cubeban-11-ol (6.5%) and allo-aromadendrene (3.1%). Monoterpenes did not contribute much to the oil, with the principal components being  $\alpha$ -pinene (2.1%),  $\beta$ -pinene (1.8%), limonene (1.3%), 1,8-cineole (1.7%), p-cymene (1.7%) and  $\alpha$ -terpineol (3.5%).

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



## *Melaleuca polandii* (F.M.Bailey) Craven



**PUBLICATION:** *Novon* 16: 473 (2006)

**DERIVATION:** *polandii*, in honour of W. Poland, a clergyman at the Bloomfield River Mission, Queensland

**SYNONYM:** *Callistemon polandii* F.M.Bailey

**DESCRIPTION:** *Shrub or tree* 1.5–4 m tall. *Branchlets* glabrescent, pubescent. *Leaves* alternate, 63–129 mm long, 16–35 mm wide, 3.5–5 times as long as wide, long- or short-petiolate; blade glabrescent, sericeous, narrowly ovate, narrowly elliptic or roundedly angular ovate, in transverse section transversely linear, the base attenuate, the apex obtusely shortly acuminate, the veins longitudinal-pinnate, 19–25. *Inflorescences* spicate, pseudoterminal and sometimes also upper axillary, scarcely interstitial (the distal leaves much reduced), 50–60 mm wide. *Hypanthium* glabrous, 3.8–4.7 mm long. *Calyx lobes* abaxially hairy (with cilia on the margin only), 1.6–2 mm long, scarious in a marginal band 0.3–0.5 mm wide. *Petals* deciduous, 3.6–5.3 mm long. *Stamens* 35–50 per flower; filaments red, 18–25 mm long; anthers apparently red. *Style* 23–29 mm long. *Ovules* c. 120–170 per locule. *Fruit* 4.6–6.5 mm long, the calyx lobes weathering away; cotyledons obvolute.

**NATURAL OCCURRENCE:** Queensland: the Cape Flattery – Cooktown district.

**ECOLOGY:** Recorded as occurring in dense wallum heath, swamp at foot of dune, on sand, and wet peaty soil.

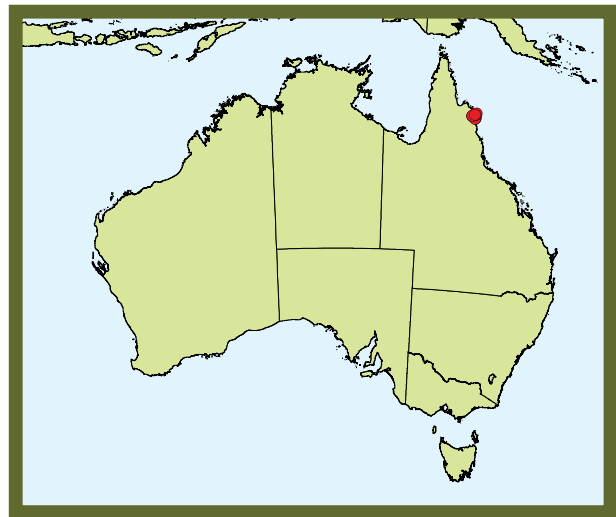
**FLOWERING TIME:** Recorded as flowering in May and from August to November.

**ESSENTIAL OILS:** This species produced very little oil and the major components were sesquiterpenoid. The major sesquiterpenes were  $\beta$ -caryophyllene (28%),  $\alpha$ -humulene (22%) and caryophyllene oxide (13.5%). These were accompanied by lesser amounts of unidentified oxygenated sesquiterpenes totalling 10%. Monoterpenes did not contribute much to the oil, with p-cymene (2%) being the major contributor and  $\alpha$ -pinene, E- $\beta$ -ocimene and 1,8-cineole (all <0.4%) the next most prevalent components. Also present was an unknown oxygenated monoterpene (7.8%).

**OIL YIELD:** The oil yield (fresh weight, w/w) was approximately 0.01%.

**REFERENCE ON ESSENTIAL OILS:** Brophy et al. 1998, as *Callistemon polandii*

**NOTES:** This species is worth trialling as an ornamental shrub in tropical regions, especially in light, sandy soils. The plants cultivated in Australia under this name are probably referable to either *M. hemisticta* or *M. pyramidalis*.



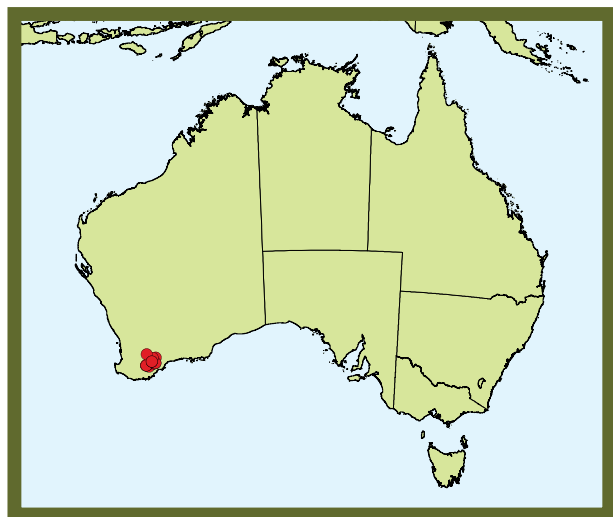
## Melaleuca polycephala Benth.



**PUBLICATION:** *Flora Australiensis* 3: 152 (1867)

**DERIVATION:** *polycephala*, from the Greek *polys*, many, and *kephale*, head, in reference to the numerous inflorescences on the type specimen

**DESCRIPTION:** *Shrub* 0.3–1 m tall. *Branchlets* glabrescent, lanuginose-sericeous (to sericeous-lanuginulose) with longer sericeous to sericeous-pubescent hairs also. *Leaves* alternate, 5–15.5 mm long, 2–4.5 mm wide, 2–4 times as long as wide, sessile; blade glabrescent, sericeous to sericeous-pubescent with lanuginose-sericeous (to sericeous-lanuginulose) hairs also and often becoming lanuginose-pubescent (to lanuginulose-puberulous) to lanuginose distally and on the margin, elliptic to narrowly elliptic or narrowly ovate to ovate, in transverse section transversely linear, the base rounded or truncate,



the apex acuminate, obtusely shortly acuminate or acute to obtuse, the veins longitudinal (with some very poorly developed pinnate-reticulate veins also), 3, *oil glands* moderately dense, obscure, scattered. *Inflorescences* capitate, pseudoterminal, with 3–7 triads, up to 12 mm wide. *Hypanthium* glabrous to glabrescent, 0.7–1.2 mm long. *Calyx lobes* abaxially glabrous, 0.2–0.4 mm long, scarious in a marginal band 0.1–0.2 mm wide to scarious throughout. *Petals* deciduous, 0.7–1.4 mm long. *Stamens* 3(–4) per bundle; filaments mauve to purple or rarely pink, 3–5 mm long, the bundle claw 0.6–1.5 mm long, 0.2–0.3 times as long as the filaments. *Style* 4.5–5 mm long. *Ovules* c. 15 per locule. *Infructescences* globose. *Fruit* 2–2.8 mm long, the calyx lobes weathering away; cotyledons planoconvex.

**NATURAL OCCURRENCE:** Western Australia: the Gnowangerup–Pingrup–Jerramungup district.

**ECOLOGY:** Recorded as occurring in open mallee woodland, mallee heathland, on sandy clay, sand over clay, and gravelly sand.

**FLOWERING TIME:** Recorded as flowering from September to November.

**ESSENTIAL OILS:** The leaf oil of this species was dominated by monoterpenes. The principal components were 1,8-cineole (31–45%) and  $\alpha$ -pinene (25–32%). These were accompanied by lesser amounts of limonene (2–4%),  $\beta$ -pinene (1–2%), terpinen-4-ol (0.9–2.0%) and  $\alpha$ -terpineol (4–5%). The main sesquiterpenes encountered were globulol (2–5%), viridiflorol (1–3%), spathulenol (3–4%), cubeban-11-ol (0.8–2.0%) and bicyclogermacrene (1–3%).

**OIL YIELD:** The oil yield (fresh weight, w/w) was 0.1–0.5%.



## *Melaleuca pomphostoma* Barlow



**PUBLICATION:** in Quinn, Cowley, Barlow & Thiele, *Nuytsia* 8: 343, fig. 4c (1992)

**DERIVATION:** *pomphostoma*, from the Greek *pomphos*, blister, and *stoma*, mouth, in reference to the distinctive pustular stomata on the leaf blade

**DESCRIPTION:** *Shrub* 0.7–1.5 m tall; bark rough and slightly spongy, blackish-grey. *Branchlets* glabrescent (sometimes the hairs ephemeral), lanuginulose to less often lanuginulose-puberulous. *Leaves* alternate, 5–10 mm long, 1–2 mm wide, 4–6.5 times as long as wide, sessile to rarely short-petiolate; blade glabrescent, lanuginulose to less often lanuginulose-puberulous, rarely with some short-pubescent (approaching puberulous) hairs also, very narrowly ovate to very narrowly elliptic or suboblong, in transverse section transversely semielliptic, depressed obovate, semicircular or flattened transversely semielliptic, the base rounded or narrowly cuneate, the apex rounded,

the veins longitudinal, 3, *oil glands* moderately dense, obscure, in rows. *Inflorescences* capitate or shortly spicate, pseudoterminal, with 3–12 monads, up to 20 mm wide. *Hypanthium* glabrous, 2.2–3 mm long. *Calyx lobes* abaxially glabrous, 1–1.5 mm long, scarious in a marginal band 0.15–0.2 mm wide. *Petals* deciduous, 2.7–3 mm long. *Stamens* 11–18 per bundle; filaments greenish-yellow to green, 7–7.5 mm long, the bundle claw 4–5.5 mm long, 0.6–0.7 times as long as the filaments. *Style* 9–15 mm long. *Ovules* c. 50–55 per locule. *Fruit* 3.5–4 mm long, with sepaline teeth; seeds not seen.

**NATURAL OCCURRENCE:** Western Australia: the Ravensthorpe – Hamersley River district.

**ECOLOGY:** Recorded as occurring in eucalypt woodland, along a seasonal creek, on clayey loam over granite, and an open greenstone area.

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

**ESSENTIAL OILS:** Monoterpenes and sesquiterpenes were present in roughly equal amounts in this leaf oil. The principal monoterpene was  $\alpha$ -pinene (23.5%) and this was accompanied by lesser amounts of  $\beta$ -pinene (6.2%), limonene (2.2%), and  $\alpha$ -terpineol (1.2%). The main sesquiterpenes were globulol (12.0%) and E,E-farnesol (8.8%). These were accompanied by lesser amounts of viridiflorol (5.8%), spathulenol (7.4%), cubeban-11-ol (3.1%), epiglobulol (1.8%) and bicyclogermacrene (2.1%).

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



## Melaleuca preissiana Schauer



**PUBLICATION:** in Lehmann, *Plantae Preissianae* 1: 143 (1844)

**DERIVATION:** *preissiana*, in honour of Ludwig J.A. Preiss (1811–1883) who made extensive plant collections in south-western Australia, including the type collection of this species

**DESCRIPTION:** *Shrub or tree* 2–10 m tall; bark papery or hard, white or pale ash-grey. *Branchlets* glabrescent, lanuginulose to lanuginulose-puberulous with scattered long sericeous-pubescent hairs also. *Leaves* alternate, 6–14 mm long, 0.7–2.1 mm wide, 3–9 times as long as wide, short-petiolate to rarely sessile; blade glabrescent, sericeous-lanuginulose with longish sericeous hairs proximally and scattered lanuginulose-puberulous and lanuginulose hairs also (these latter hair types mainly distally and along the margin), narrowly elliptic, very narrowly elliptic, narrowly ovate or very narrowly ovate, in transverse section transversely linear, the base attenuate, the apex acute, the veins longitudinal, 3, *oil glands* moderately dense, obscure, scattered. *Inflorescences* spicate, pseudoterminal or interstitial, and sometimes also

upper axillary, with 7–21 triads (sometimes an inflorescence also contains some monads), up to 20 mm wide. *Hypanthium* hairy, 1.5–2.6 mm long. *Calyx lobes* abaxially glabrous to rarely glabrescent, 0.9–1.5 mm long, herbaceous to the margin. *Petals* deciduous, 2–2.5 mm long. *Stamens* 27–36 per bundle; filaments white, creamy-white or pale yellow, 5–12 mm long, the bundle claw 2.7–6.5 mm long, 0.5–0.7 times as long as the filaments. *Style* 7.5–12 mm long. *Ovules* 55–75 per locule. *Fruit* 2.5–3 mm long, the calyx lobes usually weathering away (the extreme basal portion of the sepals may become woody and persist as a low ring around the hypanthium rim); cotyledons planoconvex (approaching subobovulate).

**NATURAL OCCURRENCE:** Western Australia: from the Jurien district south to the Albany district.

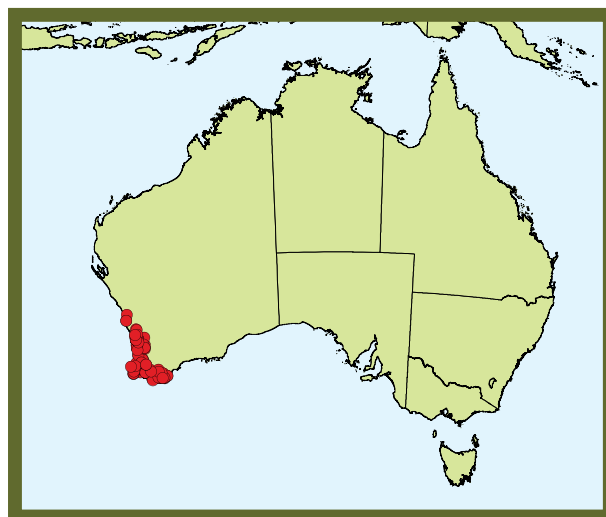
**ECOLOGY:** Recorded as occurring in swamp with low forest, fringe along tidal flats, along a dry creek, freshwater habitats, swampy ground in eucalypt forest, seasonally wet low open *Melaleuca* over heathland, on sand, sandy loam, bauxite gravel, and laterite.

**FLOWERING TIME:** Recorded as flowering from August to March.

**ESSENTIAL OILS:** The leaf oil of this species contained a mixture of mono- and sesquiterpenes, with sesquiterpenes predominating. The principal sesquiterpenes encountered were aromadendrene (2–10%), viridiflorene (1–9%),  $\beta$ -selinene (6–30%),  $\alpha$ -selinene (6–25%), globulol (1–7%) and E-nerolidol (1–5%). The principal monoterpene in the oil was  $\alpha$ -pinene (7–33%), with  $\beta$ -pinene (0.2–4.0%), limonene (0.2–2.0%) and 1,8-cineole (0.1–2.0%) also present.

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

**NOTES:** This species may have potential for use in shelter belts etc. in humid temperate regions.





## *Melaleuca pritzelii* (Domin) Barlow



**PUBLICATION:** in Quinn, Cowley, Barlow & Thiele, *Nuytsia* 8: 345 (1992)

**DERIVATION:** *pritzelii*, in honour of Ernst G. Pritzel (1875–1946) who collected herbarium specimens in south-western Australia, including the type collection of this species

**SYNONYM:** *Melaleuca densa* var. *pritzelii* Domin

**DESCRIPTION:** *Shrub* 0.6–1.6 m tall; bark rough, light grey. *Branchlets* soon glabrescent, the lanuginulose-puberulous to puberulous hairs ephemeral. *Leaves* decussate to occasionally ternate (both states may occur on a plant), 1.2–4.1 mm long, 1.2–3.5 mm wide, 1–1.6 times as long as wide, subsessile (rarely almost sessile); blade soon glabrescent, the puberulous to lanuginulose-puberulous hairs ephemeral, broadly ovate, in transverse section strongly depressed obtriangular or transversely linear, the base rounded, truncate or subcordate, the apex obtusely shortly acuminate, acute or acuminate, the veins

longitudinal, 3–5, *oil glands* moderately dense or dense, obscure or distinct, more or less in rows. *Inflorescences* capitate, usually lateral (rarely interstitial), with 4–14 monads, up to 15 mm wide. *Hypanthium* subglabrous, 1.5–2.2 mm long. *Calyx lobes* abaxially glabrous, 0.7–1 mm long, herbaceous to the margin or scarious in a marginal band up to 0.2 mm wide. *Petals* deciduous, 1.3–2 mm long. *Stamens* 2–4 per bundle; filaments cream, 5.8–7 mm long, the bundle claw 1.5–2.8 mm long, 0.2–0.5 times as long as the filaments. *Style* 5.5–8.2 mm long. *Ovules* 25–30 per locule. *Fruit* 2–2.5 mm long, with sepaline teeth; cotyledons planoconvex (approaching subobovulate).

**NATURAL OCCURRENCE:** Western Australia: the Gnowangerup – Stirling Range – Bremer Bay district.

**ECOLOGY:** Recorded as occurring in tall shrubland, swampy area in eucalypt woodland, mallee heathland, open eucalypt woodland, saline flats, on sand, sandy loam, clay, sand over clay, and gravelly sand.

**FLOWERING TIME:** Recorded as flowering in January and from August to October.

**ESSENTIAL OILS:** The leaf oil of this species was dominated by monoterpenes. The principal monoterpene detected was  $\alpha$ -pinene (61.4%) and this was accompanied by lesser amounts of limonene (1.8%),  $\alpha$ -terpineol (3.5%),  $\beta$ -pinene (1.2%) and geraniol (1.0%). The major sesquiterpenes in the oil were the alcohols globulol (6.4%), viridiflorol (4.3%), spathulenol (2.1%), epicubenol and cubeban-11-ol (both 1.2%).

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





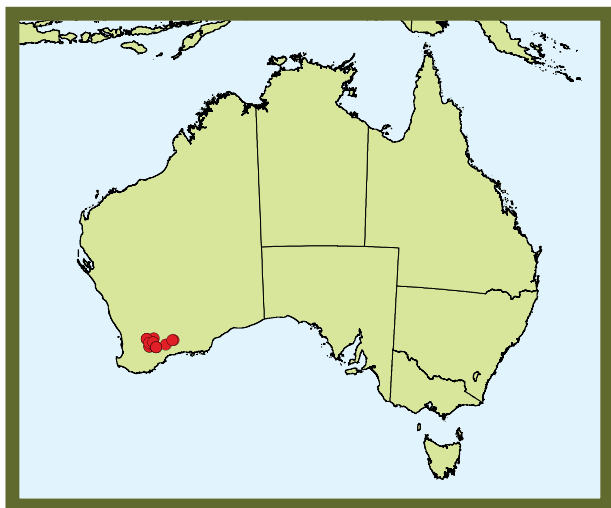
## Melaleuca procera Craven



**PUBLICATION:** in Craven & Lepschi, *Australian Systematic Botany* 12: 899 (1999)

**DERIVATION:** *procera*, from the Latin *procerus*, slender, tall, in reference to the habit of plants of this species

**DESCRIPTION:** *Shrub* 0.7–2 m tall. *Branchlets* subglabrous (occasional ephemeral hairs may occur). *Leaves* alternate, 5.5–19 mm long, 0.9–1.5 mm wide, 6–13 times as long as wide, subsessile to short-petiolate; blade subglabrous (a few scattered ephemeral hairs may occur), linear (very rarely approaching linear-obovate), in transverse section depressed obovate to subcircular, the base rounded, narrowly cuneate or parallel (blade width equals petiole width), the apex obtusely shortly acuminate or rarely obtuse to acute, the veins longitudinal, 3,



*oil glands* moderately dense, distinct to obscure rarely scattered. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 2–9 triads, up to 30 mm wide. *Hypanthium* hairy, 2.5–3 mm long. *Calyx lobes* abaxially glabrous, 1–2 mm long, scarios throughout, scarios in a marginal band 0.5–1.4 mm wide or herbaceous to the margin. *Petals* caducous, 2.5–3.5 mm long. *Stamens* 8–10 per bundle; filaments pink or pinkish-mauve, 10–12.5 mm long, the bundle claw 3–4.8 mm long, 0.3–0.4 times as long as the filaments. *Style* 11–16 mm long. *Ovules* c. 15 per locule. *Infructescences* peg-fruited. *Fruit* 3–4 mm long, the calyx lobes weathering away; cotyledons obvolvate to subobvolvate (almost planoconvex). **NATURAL OCCURRENCE:** Western Australia: the Kulin – Karlgarin – Lake Grace district.

**ECOLOGY:** Recorded as occurring in low open heath, low shrubland, on sandy loam, lateritic sandy loam, and granitic soil.

**FLOWERING TIME:** Recorded as flowering in November and December.

**ESSENTIAL OILS:** The foliar oil of this species contained over 50% monoterpenes, though there were many sesquiterpenes present in small amounts. The principal monoterpenes encountered were  $\alpha$ -pinene (28.5%) and 1,8-cineole (28.2%). Linalool (4.2%) and  $\alpha$ -terpineol (5.1%) were the only other monoterpenes that exceeded 1%. The principal sesquiterpenes encountered were globulol and viridiflorol (both 2.5%),  $\beta$ -caryophyllene (1.2%) and E,E-farnesol (6.1%).

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

## *Melaleuca protrusa* Craven & Lepschi



**PUBLICATION:** in Craven, Lepschi & Cowley, *Nuytsia* 20: 31 (2010)

**DERIVATION:** *protrusa*, from the Latin *pro-*, forward, *trusus*, thrust, in reference to the protrusion of the individual fruits from the overall more or less spheroidal shape of the fruiting clusters

**DESCRIPTION:** *Shrub* 1.8–4 m tall; basal bark papery. *Branchlets* glabrous. *Leaves* alternate, 40–90 mm long, 0.9–1.5 mm wide, 26–100 times as long as wide, subsessile to short-petiolate; blade glabrescent, sericeous to (rarely) sericeous pubescent, linear, in transverse section transversely broadly elliptic, the base parallel, the apex acuminate with a recurved mucro, 1-veined, *oil glands* not visible. *Inflorescences* capitate, pseudoterminal or lateral, with 10–16 triads, 7–11 mm wide. *Hypanthium* sericeous or sericeous-pubescent, 1.3–1.8 mm long. *Calyx lobes* abaxially glabrous, 0.5–0.8 mm long, scarious throughout. *Petals* caducous, 0.8–1.8 mm long. *Stamens* 3–5 per bundle; filaments cream to yellow, 3–4 mm long, the bundle claw 1.8–2.6 mm long, 0.5–0.6 times as long as the filaments. *Style* 4.7–5.5 mm long. *Ovules* 14–28 per locule. *Infructescences* appearing rough or cobbled due to the

protrusive fruit apices. *Fruit* 2–3 mm long, with the distal rim flat or more or less so. Seeds brown with membranous testa, cotyledons planoconvex.

**NATURAL OCCURRENCE:** Western Australia: occurs in an area bounded by the Mullewa – Dallwallinu district, east to the Sandstone – Southern Cross district.

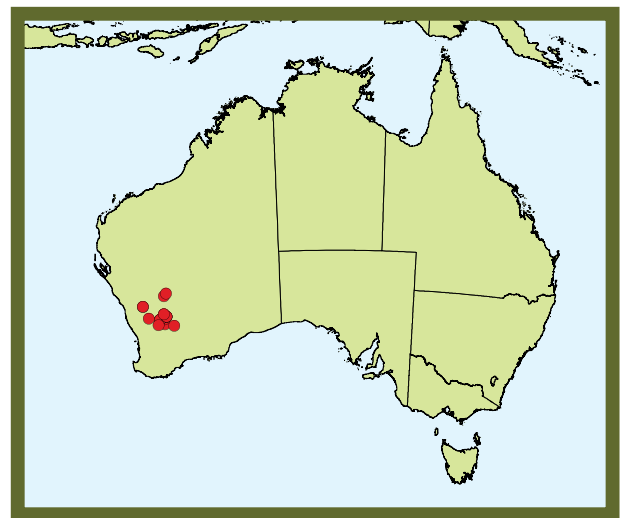
**ECOLOGY:** Recorded as occurring in open tree-mallee over shrub thicket, *Melaleuca* scrub, eucalypt–*Acacia* community, on brown sandy loam, sandy clay loam or clay, beige gravelly sand, gravelly loam over granite, and red-brown sandy loam over granite on rocky outcrop.

**FLOWERING TIME:** Recorded as flowering from September to December.

**ESSENTIAL OILS:** The major compound, in this principally monoterpene leaf oil, was 1,8-cineole (61.7%). This was accompanied by lesser amounts of  $\alpha$ -pinene (4.8%), limonene (2.4%) and  $\alpha$ -terpineol (5.9%). Sesquiterpenes were not abundant, with the main members being the alcohols spathulenol (3.8%), an unknown oxygenated sesquiterpene,  $C_{15}H_{24}O$  (4.0%), ledol, globulol, viridiflorol and the cadinol/muurolool complex (each 0.5–1.0%).

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

**NOTES:** It is not known if this species, a member of the broombush group, would be suitable for harvesting for brushwood. In view of its natural distribution and ecology, it could be useful for revegetation work etc. in arid temperate regions and may have an additional value if it is suitable for brushwood production.



## Melaleuca psammophila Diels



**PUBLICATION:** in Diels & Pritzel, *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 35: 429 (1904)

**DERIVATION:** *psammophila*, from the Greek, *psammos*, sand, and *phileo*, to love, hence sand-loving in reference to the substrate on which this species occurs

**DESCRIPTION:** *Shrub* 0.3–1.5 m tall. *Branchlets* glabrescent, lanuginose to lanuginose-pubescent or pubescent. *Leaves* alternate, 2.3–8 mm long, 0.6–1.5 mm wide, 2.8–10 times as long as wide, subsessile; blade glabrescent, pubescent, very narrowly elliptic to linear-elliptic, very narrowly obovate or linear-obovate, in transverse section semicircular to transversely semielliptic, transversely elliptic to subcircular or depressed obovate, the adaxial surface often with two shallow channels, the base narrowly cuneate, rounded or attenuate, the apex rounded to obtuse (rarely approaching more or less shortly acuminate), the veins longitudinal, 3, *oil glands* moderately dense, distinct, more or less in rows to scattered. *Inflorescences* capitate, pseudoterminal and sometimes

also upper axillary, with 1–4 triads, up to 25 mm wide. *Hypanthium* hairy, 1.8–3 mm long. *Calyx lobes* abaxially glabrous or hairy, 1.2–2.5 mm long, scarious in a marginal band 1–1.7 mm wide or scarious throughout. *Petals* deciduous, 1.8–3 mm long. *Stamens* 7–15 per bundle; filaments purple, pink, mauve, magenta or bright deep mauve-pink, 8–11.5 mm long, the bundle claw 2.5–5.2 mm long, 0.3–0.5 times as long as the filaments. *Style* 9.5–14 mm long. *Ovules* c. 15–20 per locule. *Infructescences* peg-fruited. *Fruit* 4–6.5 mm long, the calyx lobes weathering away or the basal portion of the sepals becoming woody and persisting as barely discernible undulations around the hypanthium rim; cotyledons obvolute.

**NATURAL OCCURRENCE:** Western Australia: the Nerren Nerren – Kalbarri – Geraldton district.

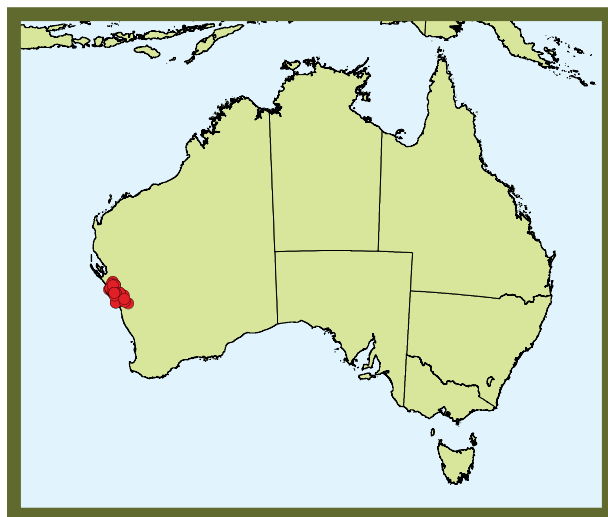
**ECOLOGY:** Recorded as occurring in shrubland, heath, closed heath, woodland, mallee heath, sand plain, on sand, sandy loam, and sand over laterite.

**FLOWERING TIME:** Recorded as flowering from September to December.

**ESSENTIAL OILS:** The leaf oil of this species contained a majority of monoterpenes though there was a considerable number of sesquiterpenes present. The principal monoterpenes were 1,8-cineole (25–29%) and  $\alpha$ -pinene (17–19%). These were accompanied by lesser amounts of  $\beta$ -pinene (0.8–17.0%), limonene (1–2%), linalool (2–4%) and  $\alpha$ -terpineol (1–4%). The main sesquiterpenes encountered were globulol (1–3%), E-nerolidol (0.5–3.0%), spathulenol (4–7%),  $\delta$ -cadinol (1–4%) and  $\alpha$ -cadinol (3–8%).

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

**NOTES:** As with *M. bisulcata* etc., this member of the *M. scabra* group may have potential as an ornamental shrub in dryish Mediterranean climates.





## *Melaleuca pulchella* R.Br.



**PUBLICATION:** in Aiton, *Hortus Kewensis*, ed. 2, 4: 414 (1812)

**DERIVATION:** *pulchella*, from the Latin *pulchellus*, beautiful and small, an apparent reference to the appearance of this plant when in flower

**DESCRIPTION:** *Shrub* 0.2–2 m tall. *Branchlets* soon glabrescent, the lanuginulose-puberulous to lanuginulose hairs ephemeral. *Leaves* alternate, 1.8–6.5 mm long, 1–2.2 mm wide, 1.3–2.4 times as long as wide, subsessile; blade soon glabrescent, the lanuginulose to lanuginulose-puberulous (rarely approaching sericeous-lanuginulose) hairs ephemeral, elliptic to rarely broadly elliptic, in transverse section lunate, the base attenuate or cuneate, the apex obtuse, the veins longitudinal, 5, *oil glands* moderately dense, distinct to rarely obscure, more or less in rows. *Inflorescences* subspicate or subcapitate, interstitial or approaching pseudoterminal, with

1–2(–4) monads, up to 20 mm wide. *Hypanthium* glabrescent, 2.5–3.6 mm long. *Calyx lobes* abaxially glabrous, 2–2.5 mm long, herbaceous to the margin or scarious in a marginal band 0.1–0.2 mm wide. *Petals* deciduous, 3.8–6.6 mm long. *Stamens* c. 45–100 per bundle (proximal filaments c. 45–80, distal filaments c. 10–15), filaments pink, mauve or mauve-pink, 10–13.5 mm long, the bundle claw 7–10 mm long, 0.7–0.8 times as long as the filaments. *Style* 8–10.5 mm long (straightened; 7 mm long unstraightened). *Ovules* c. 75–120 per locule. *Fruit* 3.3–4.5 mm long, with sepaline teeth; cotyledons planoconvex.

**NATURAL OCCURRENCE:** Western Australia: from the Hopetoun district eastwards to the Israelite Bay district.

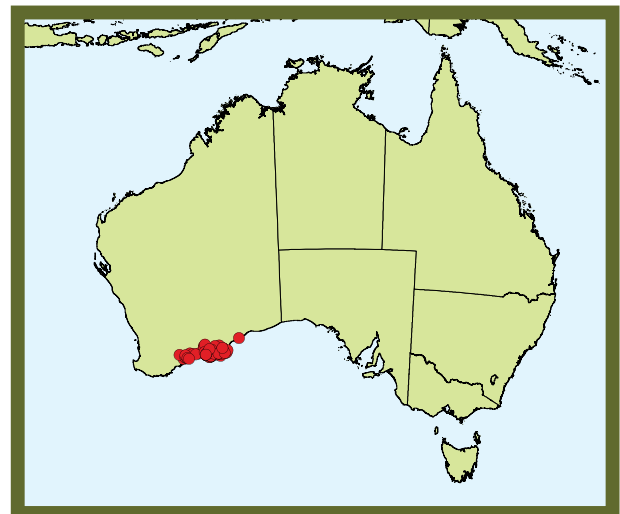
**ECOLOGY:** Recorded as occurring in swamp, open shrub mallee, mallee heath, open eucalypt woodland with dense shrubby understorey, low heathland, on peaty soil, sand dunes, granite outcrops, laterite, and sand over clay.

**FLOWERING TIME:** Recorded as flowering in April and May and from September to February.

**ESSENTIAL OILS:** This species presented a predominantly monoterpenoid oil. The principal component was 1,8-cineole (51–62%), with lesser amounts of  $\alpha$ -pinene (5–15%), limonene (2–4%), terpinolene (4–10%) and  $\alpha$ -terpineol (1–3%). The main sesquiterpenes present were globulol (3–6%), cubeban-11-ol (0.9–2.0%) and aromadendrene (1–3%).

**OIL YIELD:** The oil yield (fresh weight, w/w) was 0.4–0.7%.

**NOTES:** This species has proved to be a successful ornamental shrub in temperate and subtropical regions of Australia. The dimorphic stamens are an interesting feature of the flowers. This character state otherwise occurs only in *M. violacea*.



## Melaleuca pungens Schauer



**PUBLICATION:** in Lehmann, *Plantae Preissianae* 1: 138 (1844)

**DERIVATION:** *pungens*, from the Latin *pungens*, sharp, piercing, in reference to the sharp leaf apex

**DESCRIPTION:** *Shrub* to 2.2 m tall. *Leaves* 6.5–48 mm long, 0.4–1.4 mm wide, sessile; blade glabrous, glabrescent or hairy, linear or linear-ovate, in transverse section circular to transversely elliptic. *Inflorescences* spicate or capitate with 6–12 triads; bracteoles apparently variably present or absent on each flower in the floral unit. *Hypanthium* sericeous or glabrous. *Calyx lobes* not costate, transversely broadly elliptic to very broadly triangular to circular, 0.4–0.5 mm long. *Stamens* 5–9 per bundle; filaments yellow, 3.6–5.7 mm long. *Style* 5.3–8 mm long. *Ovules* 4–5 per locule. *Fruit* 2.3–3.4 mm long, with the distal rim flat or more or less so.

**NATURAL OCCURRENCE:** Western Australia: from the Toodyay–Cranbrook region south-eastwards to the Stirling Range – Hopetoun district.

**ECOLOGY:** Recorded as occurring in open heath and shrublands and closed heathlands; preferring sandy, silty and gravelly soils over lateritic and granitic substrates.

**FLOWERING TIME:** Recorded as flowering from August to October.

**ESSENTIAL OILS:** The leaf oil of this species was dominated by sesquiterpenes. The principal sesquiterpenes detected were bicyclogermacrene (25–29%), globulol (11–13%), viridiflorol (7–10%), viridiflorene (7–9%) and spathulenol (2–5%). There were lesser amounts of aromadendrene, allo-aromadendrene, germacrene-D and cubeban-11-ol (all <2%). Monoterpenes, while present, were mostly present in very small quantities, the one exception being  $\alpha$ -pinene (6–12%). No other monoterpene was present in amounts of >0.5%.

**OIL YIELD:** The oil yield (fresh weight, w/w) was very low, <0.03%.

**NOTES:** This species has some ornamental potential because of its showy yellow flowers but it could also have a function in deterring foot traffic when used in a hedge as its foliage is quite prickly. There is morphological variation within *M. pungens* that needs further investigation. Populations occur in which the plants have straight and stout leaves, and there are other populations in which the plants have curved and slender leaves. Due to the possible existence of intermediates, a resolution of this complex has not been attempted at present but it is likely at least two species are involved.





## *Melaleuca punicea* Byrnes



**PUBLICATION:** *Austrobaileya* 2: 74 (1984)

**DERIVATION:** *punicea*, from the Latin *puniceus*, crimson, in reference to the colour of the staminal filaments

**SYNONYMS:** *Regelia punicea* (Byrnes) Barlow; *Petraeomyrtus punicea* (Byrnes) Craven

**DESCRIPTION:** *Shrub or tree* to 2.5 m tall. *Leaves* 0.8–2 mm long, 0.5–0.9 mm wide, sessile; blade hairy or glabrescent, obovate to narrowly angular obovate or triangular to narrowly triangular, in transverse section subcrenate (margins are rounded). *Inflorescences* capitate with 1–15 monads. *Hypanthium* hairy. *Calyx lobes* costate, ovate, very broadly triangular or roundedly angular-obovate, 1.2–1.8 mm long. *Stamens* 9–13 per bundle; filaments hairy, red, crimson or bright orange-red, 4.6–12 mm long, the bundle claw 2.5–3.9 mm long and 0.2–0.5 times as long

as the filaments. *Style* 11.8–14.4 mm long. *Ovules* 4 per locule, collateral in 2 pairs. *Fruit* dry, not or scarcely woody. Seeds generally narrowly obovoid to obovoid; cotyledons obvolvate.

**NATURAL OCCURRENCE:** Northern Territory: on the western edge of the Arnhem Land plateau.

**ECOLOGY:** Recorded as occurring in heathlands and shrubby woodlands; preferring sandy soils overlying sandstone, often growing in crevices and on rocky outcrops.

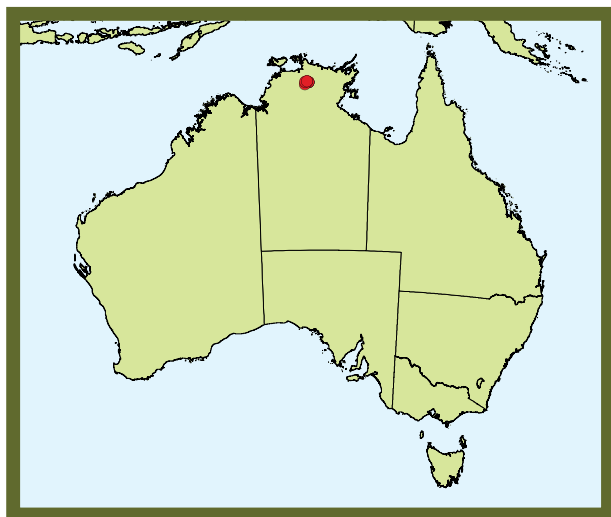
**FLOWERING TIME:** Recorded as flowering from January to November.

**ESSENTIAL OILS:** The leaf oil of this species, obtained from a 2–3-year-old dry specimen, contained more sesquiterpenes than monoterpenes, though the latter contributed a significant amount. The principal sesquiterpenes identified were globulol/viridiflorol (12.0% total), spathulenol (11.0%), aromadendrene (8.4%) and  $\beta$ -caryophyllene (2.5%). The principal monoterpenes encountered were  $\alpha$ -pinene (6.6%),  $\gamma$ -terpinene (3.9%), p-cymene (14.6%) and  $\alpha$ -terpineol (1.2%). It is suspected that on a fresh sample the level of p-cymene would be lower, as would  $\alpha$ - and  $\gamma$ -terpinene, while  $\alpha$ -phellandrene and terpinolene would be higher.

**OIL YIELD:** The oil yield has not been quantified.

**NOTES:** As mentioned in Chapter 1, *M. punicea* previously has been regarded as being misplaced in *Melaleuca* and has been transferred to *Regelia* and also to its own genus, *Petraeomyrtus*. With the new circumscription that is being proposed for *Melaleuca*, the species will be returned to this genus and hence it is included in the present volume.

The species is of considerable horticultural merit in monsoonal tropical environments.





## Melaleuca pustulata Hook.f.



**PUBLICATION:** *London Journal of Botany* 6: 476 (1847)

**DERIVATION:** *pustulata*, from the Latin *pustula*, pustule, small protuberance, in reference to the leaf blade being pustular due to prominent oil glands

**DESCRIPTION:** *Shrub* 2–5 m tall. *Branchlets* glabrescent to hairy, lanuginulose to lanuginulose-puberulous with some shorter pubescent hairs also. *Leaves* alternate or ternate (or subternate), 5–10 mm long, 0.5–1.6 mm wide, 4–9 times as long as wide, short-petiolate to sessile; blade glabrescent, lanuginulose to less often lanuginulose-puberulous, very narrowly elliptic to linear-elliptic or very narrowly obovate, in transverse section transversely semielliptic, shallowly lunate, flattened transversely semielliptic, depressed obovate or transversely, the base narrowly cuneate to attenuate, the apex acute to obtuse

or acuminate, the veins longitudinal, 3, *oil glands* moderately dense, distinct to obscure, more or less in rows. *Inflorescences* spicate or capitate, pseudoterminal, with 15–30 monads, up to 18 mm wide. *Hypanthium* glabrous (rarely a few scattered puberulous hairs may be present near the base), 1.5–2 mm long. *Calyx lobes* abaxially glabrous, 0.4–0.6 mm long, herbaceous to the margin or scarious in a marginal band up to 0.1 mm wide. *Petals* deciduous, 1.9–2 mm long. *Stamens* 5–9 per bundle; filaments white or yellowish, 4.2–8.5 mm long, the bundle claw 0.5–1(–1.4) mm long, 0.1–0.2 times as long as the filaments. *Style* 6–7 mm long. *Ovules* 50–70 per locule. *Fruit* 3–4 mm long, the calyx lobes weathering away (also becoming somewhat immersed in the hypanthium wall); cotyledons subobovate (almost planoconvex).

**NATURAL OCCURRENCE:** Tasmania: northern and eastern Tasmania.

**ECOLOGY:** Recorded as occurring in scrubland, open sclerophyll forest, open grasslands, on shallow dolerite-derived soil, and crevices on granite.

**FLOWERING TIME:** Recorded as flowering from September to January.

**ESSENTIAL OILS:** The leaf oil of this species was dominated by monoterpenes. The principal monoterpenes encountered in the oil were 1,8-cineole (72–77%), accompanied by  $\alpha$ -pinene (5–8%), limonene (6–8%) and  $\alpha$ -terpineol (4–6%). The principal sesquiterpenes found in the oil were globulol and spathulenol (both 0.3–0.5%).

**OIL YIELD:** The oil yield (dry weight, w/w) was 1.5–2.1%.



## *Melaleuca pyramidalis* Craven



**PUBLICATION:** *Novon* 19: 448 (2009)

**DERIVATION:** *pyramidalis*, from the locality of the type collection, Walshs Pyramid, Queensland

**SYNONYM:** *Callistemon pyramidalis* (Craven) Udovicic & R.D.Spencer

**DESCRIPTION:** *Shrub or tree* 1.5–3.5 m tall; bark papery, compact, dark grey. *Branchlets* glabrescent, sericeous or sericeous-pubescent (and then with a sparse layer of long hairs overlying a dense layer of shorter hairs). *Leaves* alternate, 29–84 mm long, 8–24 mm wide, 3–4.5 times as long as wide, long- or short-petiolate; blade glabrescent, sericeous or sericeous-pubescent, narrowly elliptic, narrowly obovate or elliptic, in transverse section transversely linear, the base attenuate to very narrowly attenuate, the apex obtusely shortly acuminate, very shortly acuminate or acute, the veins pinnate, 15–28, *oil glands* sparse, obscure, scattered. *Inflorescences* spicate, interstitial, with 20–50 monads, 40–60 mm wide. *Hypanthium* hairy or rarely glabrous, 2.2–3.6 mm long. *Calyx lobes* abaxially hairy (sometimes with cilia on the margin only), 1–2.3 mm long, scarious in a marginal band 0.2–0.4 mm wide or herbaceous to the margin. *Petals* deciduous, 2.8–6.3 mm long. *Stamens* 35–42 per flower; filaments red or pink,

15–24 mm long; anthers yellow. *Style* 16–32 mm long. *Ovules* c. 120–160 per locule. *Fruit* 3.8–5 mm long, the calyx lobes weathering away; cotyledons obovulate.

**NATURAL OCCURRENCE:** Queensland: the Gordonvale–Ingham region.

**ECOLOGY:** Recorded as occurring in open forest, along a creek, on rocky slopes and hill tops, rarely [?freshwater] mangrove swamp, on granite, and sandy humus soil.

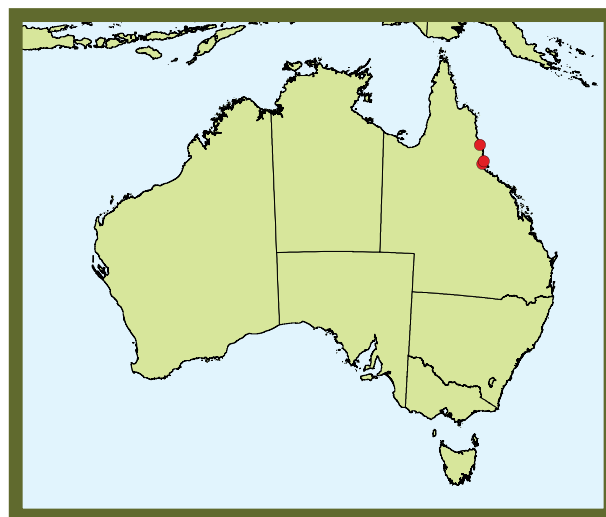
**FLOWERING TIME:** Recorded as flowering in July and August.

**ESSENTIAL OILS:** This species produced a sesquiterpenic oil in very poor yield.  $\beta$ -caryophyllene (22.4%) was the principal constituent. Other components identified in the oil were  $\alpha$ -humulene (2.3%), caryophyllene oxide (1.5%), globulol (2.7%), viridiflorol (3.4%) and spathulenol (2.7%). Monoterpenes accounted for less than 2% of the oil, with the principal components being p-cymene (0.9%) and  $\alpha$ -terpineol (0.7%), together with E- $\beta$ -ocimene, limonene and 1,8-cineole (each 0.2%).

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

**REFERENCE ON ESSENTIAL OILS:** Brophy et al. 1998, as *Callistemon* sp. Walshs Pyramid

**NOTES:** This decorative bottlebrush has been cultivated in Australia under the name *Callistemon polandii* (*M. polandii*), which is a very different species. *Melaleuca pyramidalis* should be trialled as an ornamental shrub in tropical regions, especially in the montane tropics.





## Melaleuca quadrifaria F.Muell.



**PUBLICATION:** *Southern Science Record*, ser. 2 (1886)

**DERIVATION:** *quadrifaria*, from the Latin *quattuor*, four, and *-farius*, ranked, in reference to the decussate leaves being 4-ranked

**DESCRIPTION:** *Shrub or tree* 1.5–6 m tall; bark fibrous or in sheets, grey or brown. *Branchlets* soon glabrescent, the lanuginulose hairs ephemeral. *Leaves* decussate, peltate (sometimes indistinctly so), 2.5–6.7 mm long, 0.8–1.5 mm wide, 1.7–5 times as long as wide, sessile; blade soon glabrescent, the lanuginulose hairs ephemeral, ovate-oblong, oblong or narrowly ovate to ovate, in transverse section sublunate, strongly sublunate-curved, subreniform or depressed obovate, the base truncate, the apex narrowly acute to obtuse, the veins longitudinal, 3–5, *oil glands* dense, obscure, more or less in rows (between the veins). *Inflorescences* spicate or capitate, interstitial, with 2–9 triads, up to 18 mm wide. *Hypanthium* glabrous to glabrescent, 1.5–2.8 mm long. *Calyx lobes* abaxially glabrous, faintly costate, 0.6–1 mm long, herbaceous to the margin.

*Petals* deciduous, 1.5–1.8 mm long. *Stamens* 9–13 per bundle; filaments white, 5.5–7.5 mm long, the bundle claw 1.7–2.8 mm long, 0.3–0.4 times as long as the filaments. *Style* 6.5–8 mm long. *Ovules* 15–20 per locule. *Fruit* 2–3.5 mm long, the calyx lobes weathering away (becoming slightly woody and persisting for some time thus giving the aperture a characteristic ‘star-shaped’ opening, the extreme basal portions may persist on the hypanthium rim as undulations); cotyledons obvolvate.

**NATURAL OCCURRENCE:** Western Australia, South Australia: from the Newdegate district in Western Australia to just east of the South Australian border.

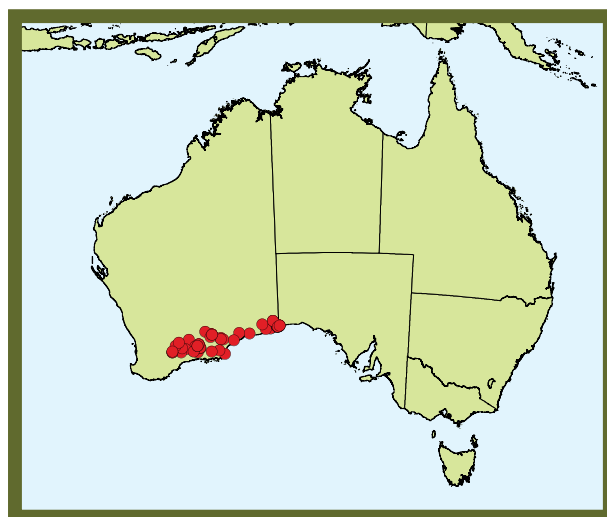
**ECOLOGY:** Recorded as occurring in tall mallee, open eucalypt and *Melaleuca* woodland, shrubland, tall eucalypt forest, *Melaleuca*–mallee shrubland, edge of saline depressions and salt lakes, on sand, clay loam, laterite knolls and limestone plain, and fine clay.

**FLOWERING TIME:** Recorded as flowering in December and January.

**ESSENTIAL OILS:** This species gave an oil with significant amounts of both mono- and sesquiterpenes. The principal monoterpene was 1,8-cineole (11–24%). This was accompanied by lesser amounts of  $\alpha$ -pinene (5–8%), limonene (0.5–3.0%) and  $\alpha$ -terpineol (0.7–4.0%). The principal sesquiterpenes were  $\gamma$ -eudesmol (9–11%),  $\alpha$ -eudesmol (3–7%),  $\beta$ -eudesmol (15–30%), elemol (1–5%), cubenol (1–5%) and  $\delta$ -cadinene (0.7–3.0%).

**ESSENTIAL OILS:** The oil yield (fresh weight, w/w) was 0.5–1.1%.

**NOTES:** Holliday (2004) recorded this to be a successful shrub on limestone soils in dry climates [in Australia]. However, as an ornamental per se, its flowers are not especially attractive.





## *Melaleuca quercina* Craven

**PUBLICATION:** *Novon* 19: 449 (2009)

**DERIVATION:** *quercina*, from *Quercus* (the oak genus) in reference to the locality Oakey Creek, Queensland

**SYNONYM:** *Callistemon quercinus* (Craven) Udovicic & R.D.Spencer

**DESCRIPTION:** *Tree* 6–10 m tall; bark corky, dark. *Branchlets* glabrescent, lanuginose. *Leaves* alternate, 23–74 mm long, 3.5–12 mm wide, 4.7–9 times as long as wide, long-petiolate; blade glabrescent, sericeous, narrowly elliptic or elliptic, in transverse section transversely linear, sublunate or obsubulate, the base very narrowly attenuate, the apex very shortly acuminate or acute, the veins pinnate, 11–20. *Inflorescences* spicate, interstitial or pseudoterminal, with 15–40 monads, 25–30 mm wide. *Hypanthium* glabrescent or glabrous, 2.5–3.2 mm long. *Calyx lobes* abaxially hairy (sometimes with cilia on the margin only), 1–1.3 mm long, herbaceous to the margin. *Petals* deciduous, 3.1–4.4 mm long. *Stamens* 70–94 per flower; filaments pink, cream or pale yellow, 10–14 mm long; anthers yellow. *Style* 12–13 mm long. *Ovules* c. 110–150 per locule. *Fruit* 3–5.3 mm long, the calyx lobes deciduous; cotyledons obvolvate.

**NATURAL OCCURRENCE:** Queensland: the Dalby–Oakey district.

**ECOLOGY:** Recorded as occurring along flats and banks of creeks and rivers, and on blackish-brown clay.

**FLOWERING TIME:** Recorded as flowering from October to February.

**ESSENTIAL OILS:** This species produced practically no leaf oil. Analysis of the fresh leaves showed the presence of a diterpene, suspected of being phytol (34–54%) and long-chain hydrocarbons (6–15%), which are suspected of being cuticle hydrocarbons. Also present was a significant number of oxygenated sesquiterpenes, individually present in small amounts, which have not been identified.

**OIL YIELD:** The oil yield (fresh weight, w/w) was <0.01%.



## Melaleuca quinquenervia (Cav.) S.T.Blake



**PUBLICATION:** *Proceedings of the Royal Society of Queensland* 69: 76 (1958)

**DERIVATION:** *quinquenervia*, from the Latin *quinque*, five, and *nervus*, nerve, in reference to the leaf blades commonly being 5-nerved

**SYNONYMS:** *Metrosideros quinquenervia* Cav.; *Melaleuca viridiflora* var. *angustifolia* (L.f.) Byrnes; *Melaleuca viridiflora* var.  $\beta$  *rubriflora* Brongn. & Gris; *Melaleuca maideni* R.T.Baker; *Melaleuca smithii* R.T.Baker

**DESCRIPTION:** *Tree* 1–25 m tall; bark papery, white, cream, orange-cream, fawn-grey or dark grey. *Branchlets* glabrescent, pubescent to puberulous hairs mixed with long to very long pubescent hairs, rarely with sericeous hairs only. *Leaves* alternate, 55–120 mm long, 10–31 mm wide, 3–8 times as long as wide, long-petiolate; blade glabrescent, sericeous (usually long and short hairs intermixed) or with short sericeous hairs overlaid with longer sericeous or sericeous-pubescent hairs, narrowly elliptic to elliptic,

rarely approaching falcate, in transverse section transversely linear, the base attenuate, the apex acute or acuminate, the veins longitudinal, 5–7, *oil glands* dense, obscure to distinct, scattered. *Inflorescences* spicate, pseudoterminal and sometimes also upper axillary, with 5–18 triads, up to 40 mm wide. *Hypanthium* glabrous or hairy, 1.5–2.5 mm long. *Calyx lobes* abaxially glabrous, not costate (though linear glands may give the appearance of costate sepals), 1–1.8 mm long, scarious in a marginal band 0.3–0.4 mm wide. *Petals* deciduous, 2.5–3.5 mm long. *Stamens* 5–10 per bundle; filaments white, cream, greenish-white, green, creamy-white or creamy-yellow, 10.5–20 mm long, the bundle claw 0.9–2.5 mm long, 0.1–0.2 times as long as the filaments. *Style* 11–18 mm long. *Ovules* c. 50–65 per locule. *Fruit* 2.7–4 mm long, the calyx lobes weathering away; cotyledons obvolvate.

**NATURAL OCCURRENCE:** Queensland, New South Wales; also Indonesia, Papua New Guinea, New Caledonia. From

Cape York Peninsula in Queensland southwards along the coastal and subcoastal regions to the Sydney district in New South Wales. Also occurs in southern Papua province, Indonesia, scattered locations through Papua New Guinea and widespread in New Caledonia. Occasionally naturalised elsewhere, e.g. Florida, USA, and the Hawaiian Islands.

**ECOLOGY:** Recorded as occurring in *Melaleuca* swamp forest, monsoonal scrub, littoral rainforest, damp heathland, grassland, open forest, low shrubland on coastal dunes, along rivers, lagoon margins, on sand, sandy loam, sandstone, laterite over sand, silty soil, and serpentine.

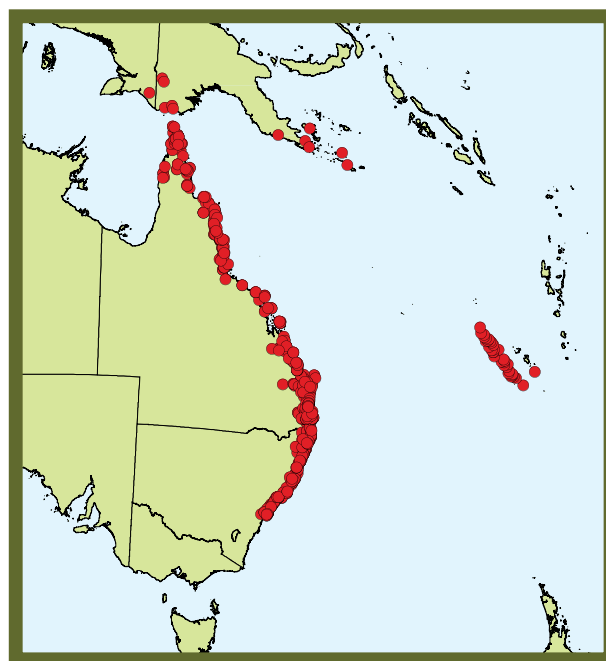
**FLOWERING TIME:** Recorded as flowering between January and December.

**ESSENTIAL OILS:** There have been reported approximately six chemotypes of this species, but in the final analysis there was a chemotype rich in E-nerolidol and another chemotype rich in 1,8-cineole or viridiflorol (or both). The nerolidol chemotype contained E-nerolidol (>92%) as its principal component; the next most prominent component being caryophyllene oxide (<1%). This chemotype occurred in two disjunct regions from south-eastern Queensland south to Sydney, New South Wales. The second chemotype contained 1,8-cineole (5–50%, the majority >15%) and viridiflorol (1–60%); the majority of the high-viridiflorol samples coming from southern Queensland and northern New South Wales. Linalool (up to 30%) has been found in the E-nerolidol chemotype in the south/central Queensland region. Globulol is also a significant component in the 1,8-cineole chemotype from New Guinea and northern Queensland. The cineole chemotype also occurs naturally in New Caledonia, where the oil from this chemotype is sold commercially as niaouli oil. The commercial oil is reported to contain 60–75% of 1,8-cineole, though there are trees with up to 25% of viridiflorol encountered. The nerolidol chemotype does not appear to occur in New Caledonia.

**OIL YIELD:** The oil yield (fresh weight, w/w) was <0.4% for samples growing north of 25°S latitude and 1.0–2.5% for samples growing south of 25°S latitude.

**REFERENCES ON ESSENTIAL OILS:** Brophy and Doran 1996; Brophy 1999; Trilles et al. 1999; Ireland et al. 2002; Trilles et al. 2006

**NOTES:** In New Caledonia, *M. quinquenervia* has been harvested for its leaf oil, called niaouli oil. As well, the species has been cultivated in plantations in Madagascar, and more recently in Vietnam, for oil production. The species is extensively planted in subtropical Australia as a park and roadside tree. Research suggests it could be used as a component of biological filtration systems in treating wastewater. The species has naturalised in North America, where it is a serious woody weed in Florida swamplands, and in northern South America and the Hawaiian Islands.





## Melaleuca radula Lindl.



**PUBLICATION:** *Edwards's Botanical Register*, Appendix vols 1–23: viii (1839)

**DERIVATION:** *radula*, from the Latin, *radula*, scraper, but the application of the epithet to this species is unclear

**DESCRIPTION:** *Shrub* 0.3–5 m tall; bark coarse. *Branchlets* glabrous. *Leaves* decussate, 10–45 mm long, 0.7–2 mm wide, 7–86 times as long as wide, short-petiolate to sessile; blade soon glabrescent, the lanuginulose-puberulous to puberulous or very rarely lanuginulose hairs ephemeral, linear or linear-elliptic to very narrowly elliptic (appearing linear due to the strongly involute margins), in transverse section sublunate-involute to strongly sublunate-curved, the base attenuate, the apex acuminate to acute, the veins longitudinal, 3, *oil glands* dense, distinct, scattered to more or less in rows. *Inflorescences* spicate, interstitial, with 2–10 monads, up to 30 mm wide. *Hypanthium* glabrous, 2.7–3.5 mm long. *Calyx lobes* abaxially glabrous, 0.5–1.6 mm long, scarious in a marginal band 0.1–0.7 mm wide. *Petals* deciduous, 4.5–6.5 mm long. *Stamens* 30–90 per

bundle; filaments mauve, white, mauve-white, purple, pink or pinkish-white, 10.5–13.5 mm long, the bundle claw 4.5–6.5 mm long, 0.4–0.6 times as long as the filaments. *Style* 7.5–12 mm long. *Ovules* c. 90–230 per locule.

**Fruit** 5.2–6.5 mm long, the calyx lobes weathering away (in young fruit a distinct 'lip' is usually present to form an urceoliform shape—this disappears eventually, apparently immersed in the fruit wall); cotyledons obvolute.

**NATURAL OCCURRENCE:** Western Australia: from the Kalbarri district south and east to the Perth and Norseman districts.

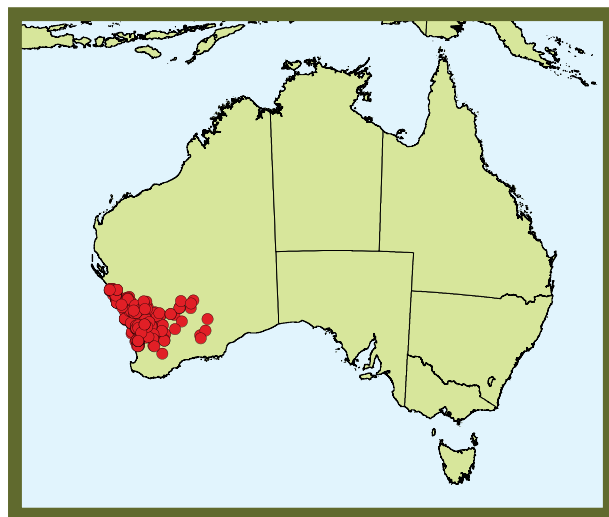
**ECOLOGY:** Recorded as occurring in open shrub mallee, open heathland, sand plain, eucalypt woodland, mallee–*Melaleuca* scrubland, low open heath, on sand with laterite, loamy clay near granite, shallow soil over quartzitic sandstone, granite, and clayey sand over sandstone.

**FLOWERING TIME:** Recorded as flowering from June to December.

**ESSENTIAL OILS:** The leaf oil of this species was dominated by monoterpenes. The principal component was 1,8-cineole (83–87%) and this was accompanied by lesser amounts of  $\alpha$ -pinene (2–5%), limonene (3%) and  $\alpha$ -terpineol (1–3%). The principal sesquiterpenes encountered in the oil were globulol (0.2%), spathulenol (0.2–0.5%) and  $\alpha$ -,  $\beta$ - and  $\gamma$ -eudesmol (each <0.3%).

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

**NOTES:** The species has been planted as an ornamental shrub in temperate Australia but it can become sparse and untidy, requiring pruning; better mauve-flowered species are available. Given that this species is widespread and adapted to a wide range of soils, and is interfertile with the red-flowered *M. fulgens*, a hybridisation program may give rise to a group of superior cultivars.



## *Melaleuca recurva* (R.D.Spencer & Lumley) Craven

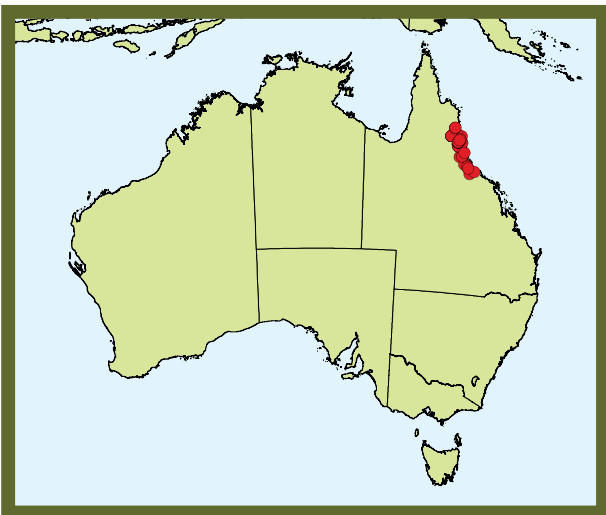


**PUBLICATION:** *Novon* 16: 473 (2006)

**DERIVATION:** *recurva*, from the Latin *recurvus*, recurved, in reference to the leaves often being slightly recurved

**SYNONYM:** *Callistemon recurvus* R.D.Spencer & Lumley

**DESCRIPTION:** *Tree or shrub* 0.8–7 m tall; bark fibrous, hard. *Branchlets* glabrescent, lanuginulose-puberulous, overlaid with more or less sericeous-pubescent to sericeous or pubescent hairs, often becoming somewhat matted. *Leaves* alternate, 15–55 mm long, 2–9 mm wide, (3–)5–10(–25) times as long as wide, short-petiolate to subsessile; blade glabrescent, sericeous to lanuginose-sericeous and rarely also with a sparse understorey of lanuginulose hairs, narrowly ovate, narrowly elliptic, elliptic, linear-elliptic or linear-obovate, in transverse section transversely linear, the base attenuate to cuneate, the apex acuminate, shortly acuminate or narrowly acute, the veins weakly c. 10–18 pinnate (superficially appearing to have 3 longitudinal veins), *oil glands* moderately dense, distinct to



obscure, scattered. *Inflorescences* spicate, interstitial, with 15–30 monads, 35–50 mm wide. *Hypanthium* hairy or rarely glabrous, 2–3 mm long. *Calyx lobes* abaxially hairy (sometimes with cilia on the margin only), 1–1.7 mm long, herbaceous to the margin or scarious in a marginal band up to 0.3 mm wide. *Petals* deciduous, 2.5–4 mm long. *Stamens* 26–36 per flower; filaments red, 10–17 mm long; anthers yellow. *Style* 16–23 mm long. *Ovules* more than 100 per locule. *Fruit* 3–5.5 mm long, the calyx lobes deciduous or weathering away; cotyledons apparently concavoconvex.

**NATURAL OCCURRENCE:** Queensland: upland country from the Atherton Tableland district south to the Bowen district.

**ECOLOGY:** Recorded as occurring in tall closed shrubland, exposed rock outcrop in rainforest, along a small drainage line through open heathy eucalypt woodland, on a rocky slope near a river, and on granite.

**FLOWERING TIME:** Recorded as flowering from January to October.

**ESSENTIAL OILS:** This species produced an oil that contained 1,8-cineole (69%) as its principal component. This was accompanied by lesser amounts of  $\alpha$ -pinene (3.8%), limonene (4.2%),  $\beta$ -pinene (1.0%), terpinen-4-ol (1.3%) and  $\alpha$ -terpineol (8.4%) as the major monoterpenes. Sesquiterpenes accounted for less than 15% of the oil, with spathulenol (1.5%) and  $\beta$ -caryophyllene (1.3%) being the principal members.

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

**REFERENCE ON ESSENTIAL OILS:** Brophy et al. 1998, as *Callistemon recurvus*

**NOTES:** Wrigley and Fagg (1993) reported that small-growing forms of this species are useful ornamental plants in Australia, even in subtropical regions.



## Melaleuca raphiophylla Schauer



**PUBLICATION:** in Lehmann, *Plantae Preissianae* 1: 143 (1844)

**DERIVATION:** *raphiophylla*, from the Greek *raphio*, needle, and *phyllon*, leaf, in reference to a perceived similarity between the longish, narrow leaves and a needle

**DESCRIPTION:** *Tree or shrub* 0.2–10 m tall; bark papery, whitish. *Branchlets* soon glabrescent, the lanuginulose hairs ephemeral. *Leaves* alternate, 8–40 mm long, 0.5–1.5 mm wide, 10–50 times as long as wide, short-petiolate to sessile; blade soon glabrescent, the lanuginulose hairs ephemeral, linear, linear-elliptic or linear-obovate, in transverse section depressed obovate, transversely semi-elliptic or circular, the base attenuate, the apex acuminate, obtusely shortly acuminate or narrowly acute, the veins longitudinal, 3, *oil glands* dense or moderately dense, obscure (though obvious in young growth), scattered. *Inflorescences* spicate or capitate, pseudoterminal, with 4–25 monads, up to 27 mm wide. *Hypanthium* glabrous to glabrescent, 1.8–2.3 mm long. *Calyx lobes* abaxially

glabrous, 0.7–1.2 mm long, scarious in a marginal band 0.05–0.3 mm wide. *Petals* deciduous, 2.5–3.5 mm long. *Stamens* 11–25 per bundle; filaments white, cream, creamy-white or creamy-yellow, 8–11.5 mm long, the bundle claw 3.5–4.5 mm long, 0.4–0.5 times as long as the filaments. *Style* 7.5–11 mm long. *Ovules* c. 30–35 per locule. *Fruit* 3–6 mm long, the calyx lobes weathering away (the extreme basal portion may become woody and persist as undulations on the hypanthium rim); cotyledons planoconvex.

**NATURAL OCCURRENCE:** Western Australia: from the Kalbarri district south to the Albany district.

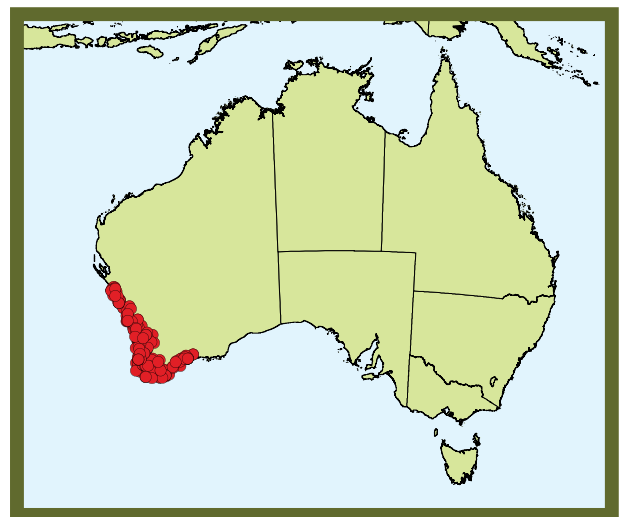
**ECOLOGY:** Recorded as occurring in riverine forest, *Melaleuca* swamp forest, along lake edges, shrubland on small granite outcrop, saltmarsh, seasonally wet open heathland, stony river bed, on sand, sandy clay, gravelly sand over laterite, limestone, sandy and peaty loam, and sand over lateritic clay over granite.

**FLOWERING TIME:** Recorded as flowering from May to January.

**ESSENTIAL OILS:** This species presented a monoterpenic oil. The principal component was 1,8-cineole (41–56%) and it was accompanied by terpinen-4-ol (8–16%),  $\alpha$ -pinene (2–3%),  $\alpha$ -terpinene (2–4%), limonene (2–4%),  $\gamma$ -terpinene (5–9%) and  $\alpha$ -terpineol (5–8%). The principal sesquiterpenes encountered in the oil were  $\beta$ -caryophyllene (2–4%), globulol (0.9–1.0%), viridiflorol (0.2–0.4%) and spathulenol (0.3–0.8%).

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

**NOTES:** *Melaleuca raphiophylla* would probably be a suitable species for shelter belts etc. in humid temperate regions. Holliday (2004) reported that it is a good species for planting along the edge of reservoirs, artificial lakes etc.





## *Melaleuca rigidifolia* Turcz.



**PUBLICATION:** *Bulletin de la classe physico-mathématique de l'Académie Impériale des Sciences de Saint-Petersbourg* 10: 342 (1852)

**DERIVATION:** *rigidifolia*, from the Latin *rigidus*, rigid, and *folium*, leaf, in reference to the stout, rigid leaves

**DESCRIPTION:** *Shrub* 0.1–3.5 m tall; bark fibrous. *Branchlets* glabrous or glabrescent, pubescent to (less often) sericeous-pubescent. *Leaves* alternate, 5–19.5 mm long, 0.8–2.3 mm wide, 4–18 times as long as wide, sessile to subsessile; blade glabrous or glabrescent, sericeous-pubescent to pubescent, very narrowly obovate, linear-obovate, narrowly oblong, linear or suboblong, subfalcate to falcate, in transverse section transversely elliptic to transversely narrowly elliptic, subcircular to circular or depressed obovate, the base truncate or parallel (blade width equals petiole width), the apex acuminate or obtuse to rounded, the veins longitudinal, 3, *oil glands* moderately dense, very obscure, in rows to more or less in rows. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 4–9 triads, up to 18 mm wide.

*Hypanthium* glabrous (rarely a very few scattered hairs may be present at the very base of the hypanthium), 1–1.5 mm long. *Calyx lobes* abaxially glabrous, 0.2–0.6 mm long, scarious throughout or scarious in a marginal band 0.05–0.2 mm wide. *Petals* deciduous, 0.6–1.5 mm long. *Stamens* 2–6 per bundle; filaments pink, purple, mauve or magenta, 4–8.5 mm long, the bundle claw 0.6–2.7 mm long, 0.1–0.4 times as long as the filaments. *Style* 5–7 mm long. *Ovules* c. 5–15 per locule. *Infructescences* globose. *Fruit* 2–4 mm long, the calyx lobes weathering away; cotyledons planoconvex.

**NATURAL OCCURRENCE:** Western Australia: from the Stirling Range – Albany district north-eastwards and eastwards to the Lake Cronin – Esperance – Wittenoom Hills district.

**ECOLOGY:** Recorded as occurring in heathland, open woodland, low heath, mallee heath, low eucalypt woodland, open shrub mallee, on sand, rocky soil, sand over clay, sandy soil over granite, clay quartzite soil, sandy laterite, clayey sand over sandstone, and loam.

**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 (46.6%) and  $\alpha$ -pinene (21.2%). These were accompanied by lesser amounts of limonene (3.0%), E- $\beta$ -ocimene (3.2%), linalool (2.0%), myrtenyl acetate (6.9%),  $\alpha$ -terpineol (5.5%) and geraniol (1.7%). Sesquiterpenes did not play a significant part in this oil, with spathulenol (0.8%), globulol (0.6%) and viridiflorol (0.4%) being the most prominent components.

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



## Melaleuca ringens Barlow



**PUBLICATION:** in Quinn, Cowley, Barlow & Thiele, *Nuytsia* 8: 346, fig. 6a (1992)

**DERIVATION:** *ringens*, from the Latin *ringor*, gape, open the mouth wide, in reference to the broad aperture of the fruit

**DESCRIPTION:** *Shrub or tree* 0.4–3 m tall. *Branchlets* glabrescent to hairy, lanuginulose-puberulous to (occasionally) sericeous-lanuginulose and usually with some short pubescent or puberulous hairs also. *Leaves* alternate, 4.5–8 mm long, 1.8–3.5 mm wide, 2–3.3 times as long as wide, sessile to short-petiolate; blade soon glabrescent, the puberulous to lanuginulose-puberulous hairs ephemeral, ovate to narrowly ovate or elliptic, in transverse section transversely linear, the base rounded or attenuate, the apex acute (rarely to

acuminate), the veins longitudinal, 5, *oil glands* sparse, obscure, scattered. *Inflorescences* spicate or rarely capitate, interstitial or pseudoterminal, with 10–60 monads, up to 20 mm wide. *Hypanthium* glabrous, 1.8–2.2 mm long. *Calyx lobes* abaxially glabrous, 0.8–1 mm long, herbaceous to the margin. *Petals* deciduous, 1.8–2.3 mm long. *Stamens* 7–11 per bundle; filaments cream or creamy-yellow, 6.5–9.5 mm long, the bundle claw 1.5–2.2 mm long, 0.2–0.3 times as long as the filaments. *Style* 8–11 mm long. *Ovules* 20–30 per locule. *Fruit* 3–4 mm long, with sepaline teeth; cotyledons obvolute.

**NATURAL OCCURRENCE:** Western Australia: the Point d'Entrecasteaux – Albany district.

**ECOLOGY:** Recorded as occurring in dense heath, on sand, and limestone-sand.

**FLOWERING TIME:** Recorded as flowering from September to November.

**ESSENTIAL OILS:** This species produced a monoterpenoid leaf oil. The principal components were 1,8-cineole (46.3%) and  $\alpha$ -pinene (17.3%). These compounds were accompanied by lesser amounts of sabinene (2.9%), limonene (6.8%), E- $\beta$ -ocimene (2.4%) and  $\alpha$ -terpineol (1.6%). The major sesquiterpenes encountered in the leaf oil were spathulenol (3.9%), caryophyllene oxide (3.3%) and  $\beta$ -caryophyllene (3.0%). Also present was an unidentified aromatic compound, molecular weight 222 (3.0%).

**OIL YIELD:** The oil yield (fresh weight, w/w) was <0.05%.





## *Melaleuca rugulosa* (Schltdl. ex Link) Craven



**PUBLICATION:** *Novon* 16: 473 (2006)

**DERIVATION:** *rugulosa*, from the Latin *ruga*, wrinkle, fold, but the reason for so naming this species is unclear

**SYNONYMS:** *Metrosideros rugulosa* Schltdl. ex Link; *Callistemon rugulosus* (Schltdl. ex Link) DC.; *Callistemon macropunctatus* (Dum.-Cours.) A.B.Court; *Callistemon macropunctatus* var. *laevifolius* (F.Muell. ex Miq.) H.Eichler

**DESCRIPTION:** *Shrub or tree* 1–5 m tall. **Branchlets** glabrescent, long pubescent hairs overlying pubescent to sericeous-pubescent hairs. **Leaves** alternate, 21–86 mm long, 2.5–8.5 mm wide, 3.5–20 times as long as wide, short-petiolate to sessile; blade glabrescent, long pubescent hairs overlying sericeous to pubescent hairs or the hairs sometimes grading and two classes not distinguishable or rarely the hairs sericeous, narrowly obovate, narrowly elliptic, linear-obovate or linear-elliptic, in transverse section transversely linear, sublunate or obsubulate, the base very narrowly cuneate or very narrowly attenuate, the apex shortly acuminate or obtusely shortly acuminate,

the veins pinnate, 7–13, **oil glands** dense or moderately dense, distinct or obscure, scattered. **Inflorescences** spicate, interstitial or approaching pseudoterminal, with 18–60 monads, 40–65 mm wide. **Hypanthium** hairy or glabrous, 3.8–4.7 mm long. **Calyx lobes** abaxially hairy, 2.1–3.8 mm long, scarious in a marginal band 0.4–0.7 mm wide. **Petals** deciduous, 4.4–6.8 mm long. **Stamens** 34–63 per flower; filaments red, reddish-purple or pink, 15–27 mm long; anthers yellow. **Style** 19–28 mm long. **Ovules** c. 300–500 per locule. **Fruit** 4.5–6.5 mm long, the calyx lobes deciduous; cotyledons concavoconvex.

**NATURAL OCCURRENCE:** South Australia, Victoria: from the Eyre Peninsula region of South Australia to western Victoria.

**ECOLOGY:** Recorded as occurring in tall shrubland, *Eucalyptus-Banksia* scrub, open stringybark forest, scrub area near swamp, cleared dune scrub, mallee, in a gorge, edge of a hillside watercourse, on sandy soil, and on calcarenite.

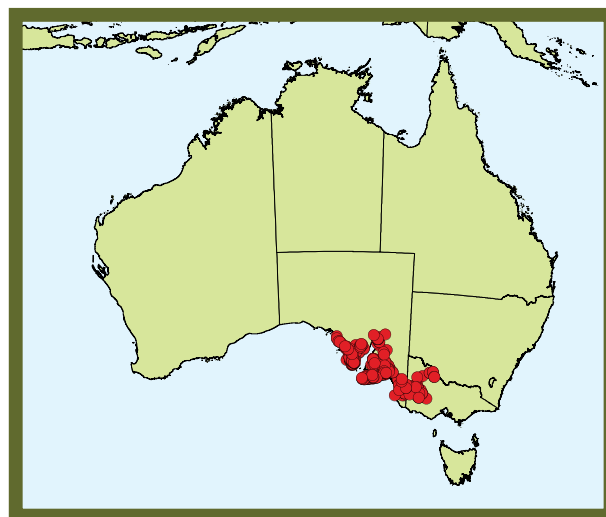
**FLOWERING TIME:** Recorded as flowering in May and from November to December.

**ESSENTIAL OILS:** This species produced a monoterpene oil. The principal component was 1,8-cineole (64–69%) and this was accompanied by lesser amounts of  $\alpha$ -pinene (8–10%),  $\beta$ -pinene (0.7%), limonene (8–9%) and  $\alpha$ -terpineol (7–10%). Sesquiterpenes did not contribute more than 10% of the oil, with the major components being an unknown alcohol (1–3%) and spathulenol (0.4%).

**OIL YIELD:** The oil yield (fresh weight, w/w) was 0.9–1.2%.

**REFERENCE ON ESSENTIAL OILS:** Brophy et al. 1998, as *Callistemon rugulosus*

**NOTES:** This species has ornamental flowers and is worth cultivating in dry to humid temperate regions. Plants can be straggly, however, and for use in gardens it would be advantageous to obtain a genotype that is naturally bushy.





## Melaleuca ryeae Craven



**PUBLICATION:** in Craven & Lepschi, *Australian Systematic Botany* 12: 901 (1999)

**DERIVATION:** *ryeae*, in honour of Barbara Lynette Rye (1952–) of Perth, Western Australia, a student of Myrtaceae in particular and who first recognised this species was distinct

**DESCRIPTION:** *Shrub* to 2.5 m tall. *Branchlets* glabrescent, pubescent with some shorter lanuginose-pubescent hairs also. *Leaves* alternate, (3–)5–6.5(–9) mm long, (1.8–)3–4(–5.8) mm wide, (1–)1.6–1.8(–2.2) times as long as wide, subsessile to short-petiolate; blade glabrescent, lanuginose-pubescent to lanuginose-sericeous and with some sericeous-pubescent hairs also, obovate, elliptic or broadly obovate, in transverse section transversely linear or sublunate, the base attenuate or cuneate, the apex obtuse to rounded or acute, the veins longitudinal-pinnate to longitudinal, 3–5 longitudinal veins and usually up to 4 weak pinnate veins, *oil glands* moderately dense, obscure to distinct, scattered to more or less in rows. *Inflorescences* capitate, pseudoterminal and sometimes

also upper axillary, with 8–15 monads, up to 25 mm wide. *Hypanthium* hairy, 1.5–2 mm long. *Calyx lobes* abaxially glabrous or hairy to glabrescent, 0.9–1.5 mm long, scarious throughout. *Petals* deciduous, 1.5–3.3 mm long. *Stamens* 5–9 per bundle; filaments pink, purple to mauve or magenta, 8–9.2 mm long, the bundle claw 1.5–4 mm long, 0.2–0.5 times as long as the filaments. *Style* 9–12.5 mm long. *Ovules* c. 10–15 per locule. *Infructescences* globose. *Fruit* 2.5–4 mm long, with sepaline teeth or the calyx lobes weathering away; cotyledons obovulate.

**NATURAL OCCURRENCE:** Western Australia: from the Arrino–Eneabba district south to the Bullsbrook district.

**ECOLOGY:** Recorded as occurring in open heath, swampy low closed forest of *Melaleuca raphiophylla*, *Acacia–Calothamnus* shrubland, low heath with emergent *Hakea*, degraded *Banksia* woodland, low shrubland, on white sand, brown sand, yellow sand, grey sand, laterite sand plain, sandy clay loam, and white clayey sand.

**FLOWERING TIME:** Recorded as flowering from September to November.

**ESSENTIAL OILS:** Monoterpenes were the dominant components in the oil of this species. The principal components were  $\alpha$ -pinene (29.4%) and 1,8-cineole (34.6%). These were accompanied by lesser amounts of  $\beta$ -pinene (2.9%), limonene (2.9%), linalool (2.0%),  $\alpha$ -terpineol (5.0%) and myrcene (1.2%). Sesquiterpenes were not prominent in this oil, with the major members being globulol (1.2%), viridiflorol (0.8%), spathulenol (1.4%) and bicyclogermacrene (1.0%).

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

**NOTES:** This species is very ornamental when in flower and it should be trialed more widely in regions with a Mediterranean climate.

