7 Species accounts

The information given for each of the species in this section is a summary of knowledge; space restrictions preclude the inclusion of all information. The information is arranged under the following headings, but note that not every heading may be relevant to a species, in which case it is not included.

TAXONOMY. In cases where infraspecific taxa are recognised, the taxa are listed here. The data relevant to the differences between the infraspecific taxa, and their natural occurrence, ecology, flowering times etc. are given under the appropriate headings. One new name is published in this volume, i.e. *M. glauca* (Sweet) Craven.

PUBLICATION. The included reference(s) is(are) the place of publication of the accepted name of each species and, where relevant, also of each non-autonymic infraspecific taxon. It is given in the standard taxonomic style, i.e. the page number is the page upon which the name is first given. There may be further relevant information given on the subsequent and/or preceding page(s).

DERIVATION. The derivation of specific and infraspecific epithets, as far as these can be ascertained, is provided.

SYNONYM(S). Only the major taxonomic or nomenclatural synonyms are given. Names that have been rarely or not used in recent decades are not included.

DESCRIPTION. This is a standard botanical statement of the species' morphology. Where decimal places do not match, this is to stress that the ranges provided are not given with a strict level of precision, owing to the nature of the materials studied.

NATURAL OCCURRENCE. The geographical distribution of each taxon is given for the plant's natural range. In a few cases where a taxon is extensively, or well known to be, naturalised, the naturalised range may also be given. The herbarium documentation of adventive or locally naturalised *Melaleuca* species within Australia and other countries needs to be encouraged, and herbarium records should clearly indicate if a taxon is adventive or is definitely naturalised, with evidence of several generations present being noted.

ECOLOGY. A brief statement of the habitat in which each taxon occurs is given.

FLOWERING TIME. Flowering times are derived from the information given on herbarium specimens and, in some cases, must be considered as a guide only, especially for taxa noted as flowering throughout the year. Sometimes an individual plant may flower well outside the usual flowering period and thus a herbarium record may not be applicable to the whole population on the particular date on which the specimens were collected.

ESSENTIAL OILS. A leaf oils profile of each taxon is given here. The full data are available online, at: **<http://aciar.gov.au/publication/MN156>**.

OIL YIELD. The yield of oil is given here; also whether the distilled foliage sample was fresh or dried material (weight for weight; w/w).

REFERENCE(S) ON ESSENTIAL OIL(S). Where the essential oil information was previously published, the reference(s) is(are) given here.

NOTES. Under this heading is information on essential oils of interest, notes on cultivation, the differences between infraspecific taxa, pertinent taxonomic or nomenclatural information and so on.

IMAGE. Where available, an image of flowering material is included. In a few cases, where no flowering material was

available, an image of young or mature fruit has been used. Many species of *Melaleuca* are variable with respect to the colour of their flowers. Sometimes the recorded variability is due to differences in the shade of a colour or the different interpretations of collectors when noting flower colour. In some species, however, the flower colour can vary dramatically, such as in *M. nervosa* whose flowers may be green, red or white to yellowish. The image included in the species' account can therefore only be considered a guide to the colour. Sourcing plants for floral ornamental purposes will require care to ensure that the desired colour form is obtained.

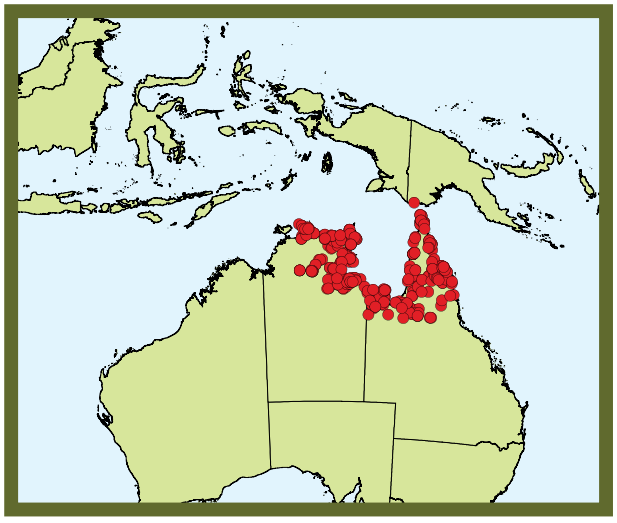
DISTRIBUTION MAP. The data upon which the distribution maps are based were drawn from records of specimens held in Australian herbaria, supplemented with data from protologues and other sources. In the case of species in which infraspecific taxa are recognised, the depicted distribution is for the species as a whole.

Melaleuca acacioides F.Muell.

PUBLICATION: *Fragmenta phytographiae Australiae* 3: 116 (1862)

DERIVATION: *acacioides*, from *Acacia*, a genus of Fabaceae, and the Greek *-oides*, resembling, in reference to the similarity, in foliage, between this species and certain species of *Acacia*

DESCRIPTION: *Tree or shrub* 1.5–10 m tall; bark papery or rarely hard, whitish or greyish or rarely brownish. *Branchlets* glabrescent to longish pubescent. *Leaves* alternate, 23–70 mm long, 6–14 mm wide, 3–9 times as long as wide, short-petiolate to subsessile; blade glabrescent, longish pubescent, narrowly obovate, obovate, narrowly elliptic or elliptic, in transverse section transversely linear, the base attenuate or cuneate, the apex rounded to acuminate, the veins longitudinal, 5–7, *oil glands* dense, distinct, scattered. *Inflorescences* capitate, lateral, pseudoterminal or interstitial, with 2–10 triads. *Hypanthium* hairy, 1.4–2 mm long. *Calyx lobes* abaxially hairy, 0.5–0.6 mm long, scarious in a marginal band 0.1–0.4 mm wide. *Petals* deciduous, 1.2–1.6 mm long. *Stamens* 6–7 per bundle; filaments white to cream, 5.9–6.7 mm long, the bundle claw 2–2.4 mm long, 0.4–0.6 times as long as the filaments. *Style* 7–7.5 mm long. *Ovules* 6–9 per locule. *Fruit* 1.6–2.3 mm long, the calyx lobes abaxially persistent; cotyledons obvolute.



NATURAL OCCURRENCE: Northern Territory, Queensland; also Papua New Guinea: from western Arnhem Land in the Northern Territory eastwards to Cape York Peninsula in Queensland. The species also occurs in southern Papua New Guinea.

ECOLOGY: Recorded as occurring generally in slightly saline areas, typically on the land side of mangrove and samphire communities, in grassland, tall myrtaceous scrub, riparian vegetation, and eucalypt woodland.

FLOWERING TIME: Recorded as flowering from May to November.

ESSENTIAL OILS: This species produced an oil that was dominated by sesquiterpenes. The principal components were β-selinene (21–30%) and α-selinene (53–55%). These were accompanied by lesser amounts of the sesquiterpenes selina-11-en-4-ol (6–9%), globulol (0.7–2.0%) and β-caryophyllene (1–2%). Monoterpenes were virtually absent from this oil.

OIL YIELD: The oil yield (fresh weight, w/w) was 0.3–0.8%.

REFERENCES ON ESSENTIAL OILS: Brophy et al. 1987; Brophy 1999

NOTES: This species may have potential for shelter belts or specimen plantings in regions with saline soils and a monsoonal tropical climate. It could be useful as a source of α- and β-selinene.

Melaleuca ***acuminata*** F.Muell.

TAXONOMY: Two subspecies are recognised within this species: subsp. *acuminata* and subsp. *websteri* (S.Moore) Barlow ex Craven

PUBLICATIONS: *Fragmenta phytographiae Australiae* 1: 15 (1858), subsp. *acuminata*; in Craven & Lepschi, *Australian Systematic Botany* 12: 858 (1999), subsp. *websteri*

DERIVATION: *acuminata*, from the Latin *acumen*, sharp point, in reference to the leaf apex; *websteri*, in honour of Leonard Clarke Webster (1870–1942), an Australian pharmacist and botanical collector, who later trained as a physician

DESCRIPTION: *Shrub or tree* 1.2–4 m tall; bark papery or fibrous, whitish or greyish-white. *Branchlets* soon glabrescent (the lanuginulose hairs ephemeral). *Leaves* decussate, 4.5–19 mm long, 0.8–4 mm wide, 2.5–18 times as long as wide, short-petiolate to subsessile; blade soon glabrescent (the lanuginulose hairs ephemeral), linear, oblong, narrowly elliptic, elliptic, narrowly ovate or ovate, in transverse section lunate, conduplicate-involute or transversely linear, the base attenuate to rounded, the apex acuminate, narrowly acute or narrowly acuminate, the veins weakly pinnate (superficially appearing to have 3 longitudinal

veins), *oil glands* sparse, distinct to obscure, scattered. *Inflorescences* capitate, lateral (often developing on older wood), with 1–8 monads, 6–20 mm wide. *Hypanthium* glabrous, 1.2–2.7 mm long. *Calyx lobes* abaxially glabrous, 0.5–1.4 mm long, scarious in a marginal band 1–2 mm wide. *Petals* deciduous, 1.5–3 mm long. *Stamens* 8–18 per bundle; filaments white or cream (rarely yellowish), 4–7.5 mm long, the bundle claw 3–4.9 mm long, 0.6–0.7 times as long as the filaments. *Style* 5.1–7.3 mm long. *Ovules* 40–80 per locule. *Fruit* 2.3–4.5 mm long, with sepaline teeth or the calyx lobes weathering away or rarely persistent; cotyledons planoconvex to subobvolute.

NATURAL OCCURRENCE: **subsp. *acuminata*:** Western Australia, South Australia, New South Wales: southern Western Australia, extending eastwards to southern South Australia and far-western Victoria and New South Wales. **subsp. *websteri*:** Western Australia: from the Wubin district south to the Wyalkatchem district.

ECOLOGY: **subsp. *acuminata*:** Recorded as occurring in mallee woodland, closed mallee shrubland, woodland and mallee heath, on white sand, clayey sand over laterite, red sand, and grey-brown calcareous loamy sand, sometimes in the vicinity of salt lakes. **subsp. *websteri*:** Recorded as occurring in *Casuarina–Eucalyptus–Melaleuca* thickets, on sandy soil, granite loam, and clay, sometimes in saline situations.

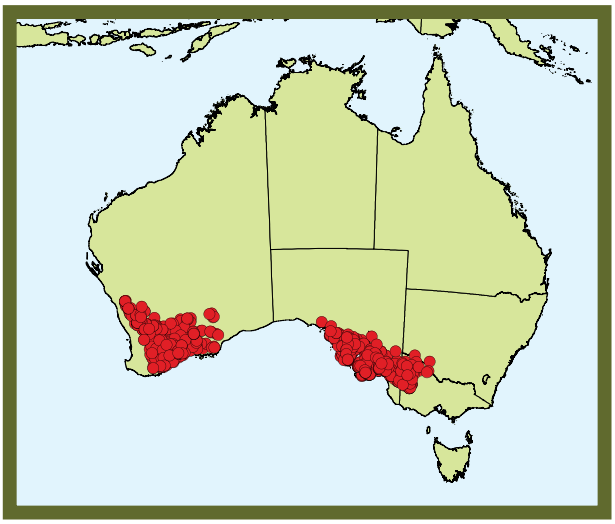
FLOWERING TIME: **subsp. *acuminata*:** Recorded as flowering from March to April, and from June to January, probably mainly flowering in winter and spring. **subsp. *websteri*:** Recorded as flowering from August to October.

ESSENTIAL OILS: **subsp. *acuminata*:** The leaf oil of this subspecies was dominated by monoterpenes. The bulk collection (of three trees) contained significant amounts of 1,8-cineole (36.4%) and terpinolene (15.5%) and was similar to subsp. *websteri*, suggesting that at least one of the trees was of this chemical form. Two further individual trees contained 1,8-cineole (52–65%) as the principal component. This was accompanied by lesser amounts of limonene (2–4%), α-pinene (1–7%), myrcene (1–3%), terpinen-4-ol (1–3%) and α-terpineol (3–6%). The major sesquiterpenes present were aromadendrene (3–5%), viridiflorene (1–3%), globulol (2–3%), viridiflorol (1–2%) and spathulenol (0.6–2.0%). A second collection (BJL 1651) contained 1,8-cineole (35–55%) and α-pinene (10–15%) as major components, with all other components being in similar amounts to those listed above. **subsp. *websteri*:** The leaf oil from this subspecies was dominated by monoterpenes. The two principal components were 1,8-cineole (24–30%) and terpinolene (25–33%). They were accompanied by lesser amounts of the monoterpenes α-pinene (2–7%), α-phellandrene (6–7%), γ-terpinene (2–3%) and lesser amounts (<1.5%) of limonene, myrcene, α-terpinene, p-cymene, terpinen-4-ol and α-terpineol. Sesquiterpenes, while reasonably plentiful, did not contribute significantly to the oil. The principal members of this class were aromadendrene (2–3%), viridiflorene (1–2%), bicyclogermacrene (0.5–2.0%), globulol (1–3%), viridiflorol (1–2%) and spathulenol (1–2%).

OIL YIELD: **subsp. *acuminata*:** The oil yield (dry weight, w/w) was 2–3%. **subsp. *websteri*:** The oil yield (fresh weight, w/w) was 1–2%.

NOTES: The two subspecies are distinguished as follows: **subsp. *acuminata*:** Leaf blade narrowly elliptic, elliptic, narrowly ovate or ovate; hypanthium 1.8–2.7 mm long; calyx lobes 0.5–1.4 mm long. **subsp. *websteri*:** Leaf blade linear, oblong or narrowly elliptic; hypanthium 1.2–1.8 mm long; calyx lobes 0.5–0.7 mm long.

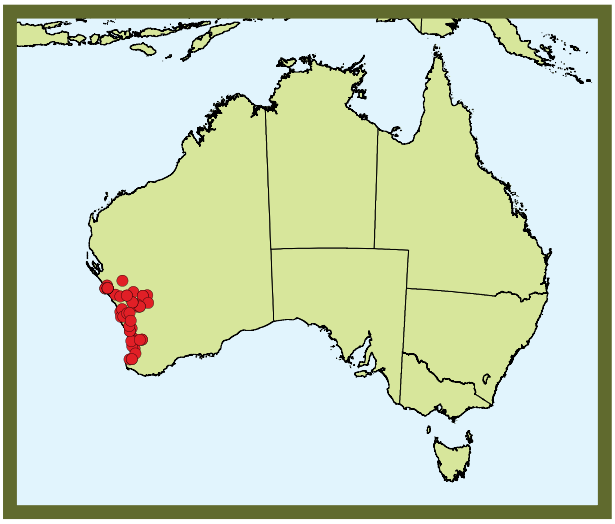
This species is regarded as adaptable and easy to grow in most soils, whether acidic or alkaline, in dry-temperate to temperate environments (Holliday 2004).



Melaleuca ***acutifolia*** (Benth.) Craven & Lepschi

PUBLICATION: *Nuytsia* 20: 28 (2010)
DERIVATION: *acutifolia*, from the Latin *acutus*, acute, *folium*, leaf
SYNONYMS: *Melaleuca lateriflora* var. *acutifolia* Benth.; *Melaleuca lateriflora* subsp. *acutifolia* (Benth.) Barlow ex Craven
DESCRIPTION: *Shrub or tree* 0.4–6 m tall; bark fibrous or papery, grey. *Branchlets* glabrescent, sericeous-pubescent to minutely sericeous or rarely pubescent or sericeous-lanuginulose to lanuginulose-puberulous. *Leaves* alternate, 7–25 mm long, 2–7.5 mm wide, 3.9–8 times as long as wide, short-petiolate to sessile; blade glabrescent, sericeous-lanuginulose, often with some lanuginulose-puberulous hairs or rarely with glabrous lamina and ciliate margin, sometimes sericeous-lanuginulose to minutely sericeous, sericeous-lanuginulose with some lanuginulose hairs or sericeous-pubescent, narrowly obovate, narrowly elliptic, very narrowly obovate or very narrowly elliptic, in transverse section lunate, sublunate or transversely narrowly elliptic (approaching transversely linear), the base cuneate, narrowly cuneate or attenuate, the apex obtusely shortly acuminate, acute, acuminate or rarely obtuse, the veins longitudinal, 5–9, *oil glands* dense or moderately dense, distinct or obscure, scattered to more or less in rows. *Inflorescences* capitate, lateral, with 1–15 monads, up to 25 mm wide. *Hypanthium* glabrous, 1.5–2.3 mm long. *Calyx lobes* abaxially glabrous, costate (sometimes faintly so), 0.7–1.3 mm long, scarious in a marginal band 0.15–0.5 mm wide. *Petals* deciduous, 2–3.4 mm long. *Stamens* 10–22 per bundle; filaments white or rarely cream, 8–10 mm long, the bundle claw 3.5–6.5 mm long, 0.5–0.8 times as long as the filaments. *Style* 8–10 mm long. *Ovules* 25–45 per locule. *Fruit* 2.8–4.2 mm long, with sepaline teeth (these at length weathering); cotyledons planoconvex (sometimes approaching subobvolute).

NATURAL OCCURRENCE: Western Australia: from the Kalbarri–Yalgoo district south to the Perth–Waroona district.
ECOLOGY: Recorded as occurring in tall closed *Melaleuca* shrubland, mallee scrubland, *Melaleuca* woodland, dense low heathland, near edge of salt pan, on sandy clay, clay loam with laterite, and saline soil.
FLOWERING TIME: Recorded as flowering from December to March.
ESSENTIAL OILS: The leaf oil of this species was overwhelmingly monoterpenoid in character. The principal component was 1,8-cineole (76.5%). This was accompanied by lesser amounts of α-pinene (3.4%), β-pinene (1.9%), limonene (3.7%), p-cymene (1.1%) and α-terpineol (9.1%). Sesquiterpenes were neither abundant nor plentiful, with the principal component being spathulenol (0.6%).
OIL YIELD: The oil yield (fresh weight, w/w) was 0.3%.
NOTES: Based upon its natural distribution and ecology, this species should be suitable for regions with a dry Mediterranean climate and slightly saline soils.



Melaleuca ***adenostyla*** K.J.Cowley

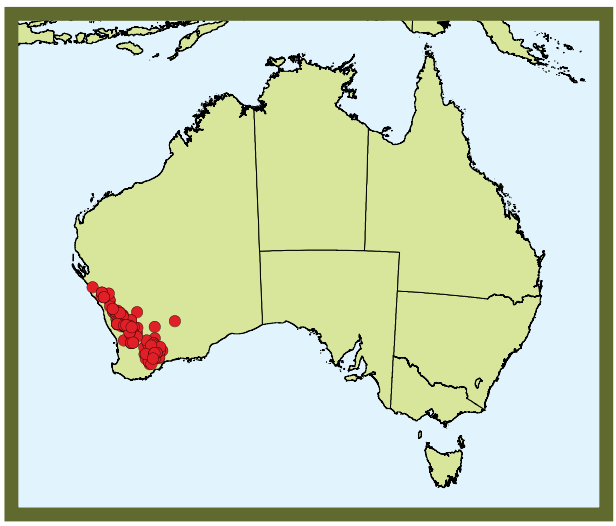
PUBLICATION: in Cowley, Quinn, Barlow & Craven, *Australian Systematic Botany* 3: 171, fig. 2c–d (1990)
DERIVATION: *adenostyla*, from the Greek *adenos*, gland, and *stylos*, style, in reference to the glandular style
DESCRIPTION: ***Shrub*** 1.5–5 m tall. ***Branchlets*** soon glabrescent (the ephemeral hairs lanuginulose). ***Leaves*** decussate, 6–16 mm long, 0.8–1.2 mm wide, 5–16 times as long as wide, short-petiolate; blade soon glabrescent (the ephemeral hairs lanuginulose), linear or narrowly elliptic, in transverse section lunate, shallowly lunate or semicircular, the base attenuate to cuneate, the apex narrowly acuminate or narrowly acute, the veins weakly pinnate (superficially appearing to have 3 longitudinal veins), ***oil glands*** sparse to dense, distinct to obscure, scattered. ***Inflorescences*** spicate, pseudoterminal, with 1–12 monads, up to 18 mm wide. ***Hypanthium*** glabrous, 2.2–2.7 mm long. ***Calyx lobes*** abaxially glabrous, 0.5–1.2 long, scarious in a broad marginal band 1–2 mm wide. ***Petals*** deciduous, 1.8–2.4 mm long. ***Stamens*** 11–21 per bundle; filaments cream, 4.6–6.8 mm long, the bundle claw 3.3–4.4 mm long, 0.6–0.7 times as long as the filaments. ***Style*** 4.9–6.3 mm long. ***Ovules*** 60–75 per locule. ***Fruit*** 3.5–5 mm long, with sepaline teeth or rarely the lobes persistent; cotyledons planoconvex to flattened planoconvex.
NATURAL OCCURRENCE: Western Australia: from the Dumbleyung district eastwards to the Hyden–Newdegate district.
ECOLOGY: Recorded as occurring in open eucalypt woodland, with scattered shrubs on a grassy roadside, in a swampy saline depression, saltmarsh, in sandy loam over clay, and gravelly sandy soil.
FLOWERING TIME: Recorded as flowering in October.
ESSENTIAL OILS: This species produced a predominantly monoterpenoid oil. The principal component of the leaf oil was 1,8-cineole (66.8%). This was accompanied by lesser amounts of α-pinene (14.1%), limonene (4.9%) and α-terpineol (4.4%). Sesquiterpenes accounted for less than 10% of the oil, with the principal components being spathulenol (1.2%), bicyclogermacrene (1.4%), viridiflorene (0.7%) and globulol (0.8%). Also present was an unknown, assumed aromatic, compound of molecular weight 236 (1.6%).
OIL YIELD: The oil yield (fresh weight, w/w) was 0.1%.

Melaleuca ***adnata*** Turcz.

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

DERIVATION: *adnata*, from the Latin *adnatus*, adnate, in reference to the leaf orientation

DESCRIPTION: *Shrub* 0.8–6 m tall; bark papery-fibrous. *Branchlets* glabrescent, pubescent or lanuginose. *Leaves* decussate, peltate, 4.3–12.5 mm long, 1.4–3.8 mm wide, 2–9 times as long as wide, sessile; blade glabrescent to hairy, lanuginose-pubescent, pubescent or lanuginose, sometimes also with sericeous hairs, narrowly ovate, ovate or narrowly elliptic, in transverse section lunate, shallowly lunate or transversely semielliptic, the base attenuate or truncate, the apex narrowly acute to very narrowly acute, the veins longitudinal, 5–7, *oil glands* obscure to distinct, more or less in rows. *Inflorescences* spicate, lateral (usually below the leaves) and rarely also interstitial in that a leafy axis may be distal to the inflorescence, with 8–50 monads, up to 15 mm wide. *Hypanthium* hairy (sometimes very sparsely so), 1.2–1.5 mm long. *Calyx lobes* abaxially glabrous, usually costate, 0.8–1.1 mm long, scarious in a broad marginal band 0.1–0.2 mm wide. *Petals* usually caducous, 1.7–2.1 mm long. *Stamens* 10–16 per bundle; filaments white, cream or rarely pale pink, 2.7–6.8 mm long, the bundle claw 1.8–3.8 mm long, 0.5–0.7 times as long as the filaments. *Style* 5.5–9.3 mm long. *Ovules* 7–13 per locule. *Fruit* 2–3.3 mm long, the calyx lobes abaxially usually weathering away, rarely replaced by poorly developed sepaline teeth or the lobes persistent; cotyledons obvolute.



NATURAL OCCURRENCE: Western Australia: from the Kalbarri district south and east to the Ongerup and Mt Holland districts.

ECOLOGY: Recorded as occurring in dense low shrubland, open eucalypt woodland, tall open eucalypt forest, mallee, sparse tall shrubland, clay depression, on brown sandy soil, sandy loam with laterite, stony slopes, and red loam.

FLOWERING TIME: Recorded as flowering from July to January.

ESSENTIAL OILS: The leaf oil of this species contained mainly monoterpenes. The principal components were 1,8-cineole (28–39%), β-pinene (18–20%), α-pinene (6–8%), limonene (7–9%) and α-terpineol (7–8%). The main sesquiterpenes were α-, β- and γ-eudesmol (each 2–5%) and globulol (1–3%).

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

Melaleuca agathosmoides C.A.Gardner

PUBLICATION: *Hooker's icones plantarum, ser. 5*, 4: t. 3381 (1939)

DERIVATION: *agathosmoides*, from *Agathosma*, a genus of Rutaceae, and the Greek *-oides*, resembling, in reference to a perceived resemblance to species of *Agathosma*

DESCRIPTION: *Shrub* 0.5–1.5 m tall; bark fibrous. *Branchlets* glabrous. *Leaves* decussate, peltate, 2–3 mm long, 1–1.8 mm wide, 1.4–2 times as long as wide, sessile; blade glabrescent (hairs present as marginal cilia only), obovate, elliptic or oblong, in transverse section lunate or broadly v-shaped, the base truncate to cordate, the apex rounded or broadly acute, the veins longitudinal, 5, *oil glands* sparse, distinct, scattered. *Inflorescences* lateral (produced on old wood, the flowers often in lines), with 1–20 monads. *Hypanthium* glabrous, 1.8–2.5 mm long. *Calyx lobes* abaxially glabrous, costate, 1.5–2 mm long, scarious in a marginal band 1–2 mm wide. *Petals* deciduous, 3.0–4.5 mm long. *Stamens* 12–19 per bundle; filaments white or greenish-white, 3.2–6.0 mm long, the bundle claw 2.5–5.0 mm long. *Style* 6.0–7.6 mm long. *Ovules* 20–30 per locule. *Fruit* 3.5–4.5 mm long, with sepaline teeth; cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: the Lake King district.

ECOLOGY: Recorded as occurring in *Melaleuca* shrubland, regenerating mallee with shrub understorey, on brown stony clay soil, red clay, and well-drained loamy clay.

FLOWERING TIME: Recorded as flowering from July to November.

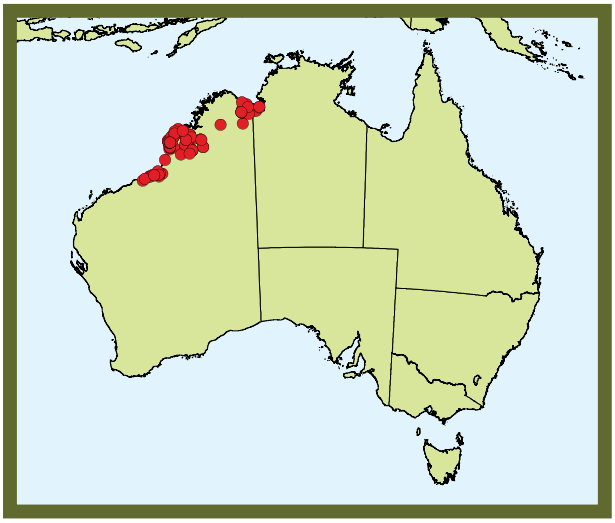
ESSENTIAL OILS: This species produced a mainly monoterpenoid oil, though no compound predominated. The principal monoterpenes encountered were α-pinene (14.3%), β-pinene (8.0%), pinocarvone (4.0%), trans-pinocarveol (10.7%), verbenone (8.3%) and an unknown oxygenated monoterpene, molecular weight 148. The main sesquiterpenes encountered were spathulenol (7.8%), globulol (7.5%) and ledol (2.2%).

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

NOTES: This species has novelty interest as its flowers seemingly erupt from the branchlets and branches but the flowers unfortunately are not as attractive as they are in the pink- to purple-flowered *M. suberosa*, another species in which the flowers are inserted on the branches.

Melaleuca alsophila A.Cunn. ex Benth.

PUBLICATION: *Flora Australiensis* 3: 137 (1867)
DERIVATION: *alsophila*, from the Greek, *alsos*, grove, and *-philos*, loving, in reference to the common occurrence of this species in groves
SYNONYM: *Melaleuca acacioides* subsp. *alsophila* (A.Cunn. ex Benth.) Barlow
DESCRIPTION: *Tree or shrub* 3–15 m tall; bark papery, white, pale grey or brownish-white. *Branchlets* glabrescent to sericeous. *Leaves* alternate, 25–85 mm long, 5–11 mm wide, 3.5–10.5 times as long as wide, short-petiolate; blade glabrescent to sericeous with many lanuginulose hairs, narrowly elliptic or narrowly obovate, in transverse section transversely linear, the base attenuate, the apex obtuse, rounded, acute, narrowly acute or acuminate, the veins longitudinal, 5–7, *oil glands* dense to sparse, usually obscure, scattered. *Inflorescences* capitate, usually lateral or sometimes pseudoterminal or rarely interstitial, with 2–15 dyads, 12–15 mm wide. *Hypanthium* hairy, 1.2–1.6 mm long. *Calyx lobes* abaxially glabrous or hairy, 0.8–1 mm long, scarious in a marginal band 0.2–0.3 mm wide. *Petals* caducous, 1.8–2.3 mm long. *Stamens* 9–16 per bundle; filaments white to cream (rarely recorded as reddish), 3.4–6.8 mm long, the bundle claw 2–3.1 mm long, 0.3–0.5 times as long as the filaments. *Style* 6.7–8 mm long. *Ovules* 6–9 per locule. *Fruit* 1.5–2.3 mm long, the calyx lobes abaxially persistent or deciduous; cotyledons obvolute.
NATURAL OCCURRENCE: Western Australia, Northern Territory: the Kimberley region of Western Australia and the adjacent region of the Northern Territory, and the northern coastal region of the Great Sandy Desert region of Western Australia.
ECOLOGY: Recorded as occurring in low open woodland, edges of saltmarsh behind mangrove, vine thicket behind coastal dune, low-lying woodland, sandy creek beds, on silty soil, white clay, red sand, black alluvial soil, and rocky slopes.
FLOWERING TIME: Recorded as flowering from May to December.
ESSENTIAL OILS: This species appeared to exist in several chemical forms, in which α-pinene/1,8-cineole or p-cymene/terpinen-4-ol were prominent. The pinene/cineole form (GJM 1764) contained α-pinene (8–66%) or 1,8-cineole (15–66%) as principal component, with lesser amounts of trans-pinocarveol (1–17%) as the next most abundant component. No other component was more than 1%. The p-cymene/terpinen-4-ol form (BVG 2354) contained p-cymene (21–44%), terpinen-4-ol (15–28%) and geranial (12–19%) as principal components, with lesser amounts of α-pinene (2–4%) and limonene (1–3%). Another collection (JB 156, from Derby) contained 1,8-cineole (30–44%) and terpinen-4-ol (15–28%) as principal components.
OIL YIELD: The oil yields (fresh weight, w/w) were 0.1% (GJM 1764), 1.0–1.2% (BVG 2354) and 0.1–0.3% (JB 156).
REFERENCES ON ESSENTIAL OILS: Brophy et al. 1987; Brophy 1999
NOTES: As with *M. acacioides*, this species may have potential for shelter belts or specimen plantings in regions with saline soils and a monsoonal tropical climate. There may be potential for cultivation of the chemical variety containing terpinen-4-ol/geranial, although a market would have to be found for this oil type and the yields would have to be improved.



Melaleuca alternifolia (Maiden & Betche) Cheel

PUBLICATION: *Journal and Proceedings of the Royal Society of New South Wales* 58: 195 (1924)

DERIVATION: *alternifolia*, from the Latin *alternus*, alternate, *folium*, leaf, in reference to the leaf arrangement

DESCRIPTION: *Shrub or tree* 2.5–14 m tall; bark papery, peeling in long flakes, reddish-brown. *Branchlets* glabrescent, lanuginulose or lanuginose-pubescent. *Leaves* usually alternate (sometimes alternate and ternate or rarely alternate and decussate), 10–32 mm long, 0.4–1 mm wide, 20–40 times as long as wide, short-petiolate to subsessile; blade glabrescent, lanuginulose or lanuginose-pubescent, linear, in transverse section shallowly lunate, lunate or transversely semielliptic, the base attenuate, the apex narrowly acute, the veins apparently longitudinal, 3, *oil glands* dense or moderately dense, distinct to obscure, scattered to more or less in rows. *Inflorescences* spicate, pseudoterminal and often also upper axillary, rarely approaching interstitial, with 6–24 monads, up to 25 mm wide. *Hypanthium* glabrous or sometimes hairy, 1.7–2 mm long. *Calyx lobes* abaxially glabrous, 1.1–1.3 mm long, scarious in a marginal band 0.1–0.2 mm wide. *Petals* deciduous, 2.3–2.7 mm long. *Stamens* 33–41 per bundle; filaments white, 13–14 mm long, the bundle claw 8.6–10.5 mm long, 0.7–0.8 times as long as the filaments. *Style* c. 3.8 mm long. *Ovules* c. 85 per locule. *Fruit* 2.8–4 mm long, the calyx lobes abaxially persistent or replaced by sepaline teeth; cotyledons obvolute.

NATURAL OCCURRENCE: Queensland, New South Wales: from the Stanthorpe district in Queensland south and east into New South Wales to the Lismore and Grafton areas, with disjunct populations near Port Macquarie. Range in elevation is from near sea level to 800 m.

ECOLOGY: Recorded as occurring on coastal plains and adjacent ranges where it grows on seasonally inundated swamps and along watercourses, on mainly alluvial silty loams, and sandy loams derived from granite.

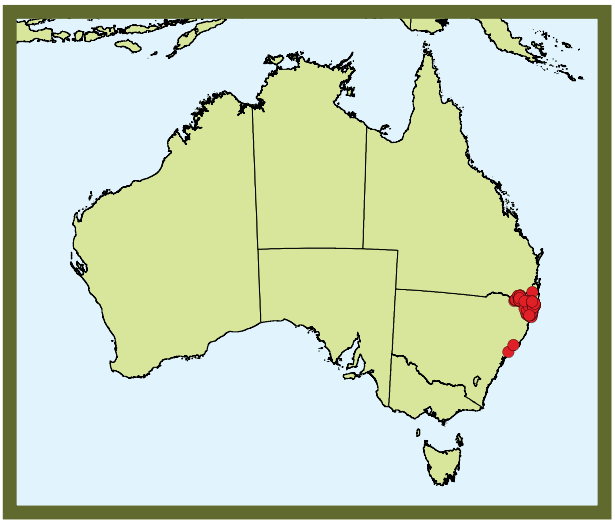
FLOWERING TIME: Recorded as flowering from June to February.

ESSENTIAL OILS: This species was reported by Homer et al. (2000) to contain six chemotypes and, while statistics do show this, principally there were three main chemical forms. The main commercial chemotype contained terpinen-4-ol (30–40%, with some provenances going up to 50%). This was accompanied by significant amounts of α-terpinene and γ-terpinene. Chemotype II contained 1,8-cineole (25–90%) and associated monoterpenes. Chemotype III contained terpinolene (40–55%) as its principal component.

OIL YIELD: The oil yield (fresh weight, w/w) was 3–6%, though the terpinolene chemotype (chemotype III) was lower (4–5%).

REFERENCES ON ESSENTIAL OILS: Southwell et al. 1992; Southwell 1999 and references therein; Homer et al. 2000

NOTES: Selected forms of *M. alternifolia* are used as a source of tea tree oil and this is discussed separately (see Chapter 3). The species is also suitable for use as an ornamental and is probably more reliable in damp soils than the closely related *M. linariifolia*.



Melaleuca amydra Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 859 (1999)

DERIVATION: *amydra*, from the Greek *amydros*, indistinct, unclear, in reference to the similarity of this species to *M. seriata* and *M. ryeae*

DESCRIPTION: *Shrub* 0.3–2.5 m tall; bark fibrous. *Branchlets* glabrescent, pubescent to lanuginose-pubescent or lanuginose to lanuginulose. *Leaves* alternate, (2.8–)3.5–6(–7.6) mm long, (1.3–)1.5–2(–2.7) mm wide, (1.5–)2–2.8(–4.8) times as long as wide, subsessile or rarely short-petiolate; blade glabrescent, lanuginose-pubescent to pubescent, or sometimes lanuginose, elliptic to narrowly elliptic or rarely narrowly obovate, in transverse section transversely linear, sublunate or lunate, the base narrowly cuneate or rarely cuneate or attenuate, the apex obtuse to rounded or rarely acute, the veins longitudinal, 3, *oil glands* moderately dense, distinct to obscure, in rows (sometimes more or less so) or scattered. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 7–20 monads, up to 20 mm wide. *Hypanthium* hairy, 1.5–2 mm long. *Calyx lobes* abaxially glabrous or hairy, 0.5–1.8 mm long, scarious in a marginal band 0.25–0.9 mm wide or scarious throughout. *Petals* deciduous, 1.5–3 mm long. *Stamens* 5–10 per bundle; filaments pink or mauve to purple, 7–10 mm long, the bundle claw 2.5–4 mm long, 0.3–0.5 times as long as the filaments. *Style* 8.5–10.5 mm long. *Ovules* 10–15 per locule. *Infructescences* peg-fruited or sometimes approaching globose. *Fruit* 3–3.5 mm long, often with very weakly developed sepaline teeth; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: from the Arrowsmith River district south to the Dandaragan–Moora district.

ECOLOGY: Recorded as occurring in open heath, sand plain, heath on marshy flat, low closed forest, shrubland, a flood plain, on sand over lateritic gravel and clay, peaty sand, and loam.

FLOWERING TIME: Recorded as flowering from September to November.

ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal component was 1,8-cineole (55.2%) and there were lesser amounts of α-pinene (11.7%), β-pinene (2.0%), limonene (1.8%), linalool (1.2%) and α-terpineol (4.0%). Sesquiterpenes did not contribute much to the oil. Their major components were spathulenol (7.8%), bicyclogermacrene, globulol and α-cadinol (all 0.5–1.0%).

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

Melaleuca ***apodocephala*** Turcz.

PUBLICATION: *Bulletin de la classe physico-mathématique de l'Académie Impériale des Sciences de Saint-Pétersbourg* 10: 340 (1852)

DERIVATION: *apodocephala*, from the latinised Greek, *apodus*, sessile, and *-cephalus*, headed, in reference to the sessile inflorescence

DESCRIPTION: *Shrub* 0.2–4 m tall. *Branchlets* soon glabrescent (the lanuginulose hairs ephemeral). *Leaves* alternate, 4–11.5 mm long, 0.7–1.7 mm wide, 5–12 times as long as wide, subsessile to short-petiolate; blade soon glabrescent (the lanuginulose-puberulous to lanuginulose hairs ephemeral), linear, linear-obovate, linear-ovate, very narrowly obovate or very narrowly ovate, in transverse section transversely narrowly elliptic, transversely elliptic, subcircular or flattened transversely semielliptic, the base broadly attenuate or narrowly cuneate, the apex obtusely shortly acuminate, acuminate, narrowly acute, acute or rounded, the veins longitudinal, 3, *oil glands* sparse, obscure, more or less in rows. *Inflorescences* capitate, lateral or pseudoterminal and then approaching interstitial, with 1–15 monads, up to 12 mm wide. *Hypanthium* glabrescent, 1–2 mm long. *Calyx lobes* abaxially glabrescent or glabrous, 0.6–1.2 mm long, herbaceous to (or almost to) the margin. *Petals* deciduous, 1.2–2.3 mm long. *Stamens* 6–13 per bundle; filaments white or creamy-white, 1.5–5.5 mm long, the bundle claw 0.2–0.3 mm long, 0.1–0.4 times as long as the filaments. *Style* 4–6 mm long. *Ovules* 15–40 per locule. *Fruit* 3–5.5 mm long, with sepaline teeth; cotyledons subobvolute (almost planoconvex).

NATURAL OCCURRENCE: Western Australia: from the Stirling Range east to the Truslove district.

ECOLOGY: Recorded as occurring in low open heath, dense low heath in open shrub mallee, on sand, and damp sandy loam.

FLOWERING TIME: Recorded as flowering from January to December.

ESSENTIAL OILS: This species produced a leaf oil that contained significant amounts of both mono- and sesquiterpenes. The principal monoterpenes were α-pinene (14.8%), β-pinene (15.0%), limonene (8.6%) and α-terpineol (2.8%). The major sesquiterpenes detected were spathulenol (13.0%), globulol (10.3%), bicyclogermacrene (2.6%), cubeban-11-ol (2.7%), β-caryophyllene (1.9%), viridiflorene (1.0%) and viridiflorol (3.1%).

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

Melaleuca ***apostiba*** K.J.Cowley

PUBLICATION: in Cowley, Quinn, Barlow & Craven, *Australian Systematic Botany* 3: 182, fig. 7c (1990)
DERIVATION: *apostiba*, from the Greek *apostibes*, off the road, solitary, in reference to the isolated locality of the type collection, the only collection then known
DESCRIPTION: *Shrub* to 2 m tall; bark fibrous, grey. *Branchlets* hairy, with both lanuginulose and subsericeous hairs. *Leaves* alternate, 6.5–11 mm long, 1.3–1.7 mm wide, 5–7 times as long as wide, short-petiolate to subsessile; blade glabrescent, with both lanuginulose and subsericeous hairs, narrowly obovate or narrowly elliptic, in transverse section transversely narrowly oblong or sublunate, the base attenuate, the apex acute or acuminate, the veins longitudinal, 3, *oil glands* sparse, distinct, scattered. *Inflorescences* spicate, lateral, with c. 30 monads, up to 35 mm wide. *Hypanthium* hairy, 1.8–2.5 mm long. *Calyx lobes* abaxially hairy, 1.6–2.1 mm long, herbaceous to (or almost to) the margin. *Petals* deciduous, 3.5–4.4 mm long. *Stamens* 11–16 per bundle; filaments red, 15–18 mm long, the bundle claw 8–10.2 mm long, 0.5–0.6 times as long as the filaments. *Style* 15–22 mm long. *Ovules* 110–140 per locule. *Fruit* not seen.

NATURAL OCCURRENCE: Western Australia: the Laverton – Lake Minigwal district.
ECOLOGY: Recorded as occurring in mallee shrubland, on deep red sand.
FLOWERING TIME: Recorded as flowering in June and July.
ESSENTIAL OILS: This species presented a monoterpenoid oil. The principal component was 1,8-cineole (81.3%). This was accompanied by lesser amounts of α-pinene (3.4%), limonene (3.8%), α-terpineol (4.9%), β-pinene (0.9%) and p-cymene (0.8%). Sesquiterpenes were neither numerous nor plentiful, with the principal components being spathulenol (0.3%), globulol and viridiflorol (both 0.1%).
OIL YIELD: This analysis was performed on 0.3 g of a 4-year-old air-dried herbarium sample and as a result there is no oil yield given.
NOTES: This species is little known but it could be worth trialling as an ornamental in arid regions, as suggested by Elliot and Jones (1993).

Melaleuca araucarioides Barlow

PUBLICATION: in Quinn, Cowley, Barlow & Thiele, *Nuytsia* 8: 334, fig. 1a (1992)

DERIVATION: *araucarioides*, from *Araucaria*, a genus of Araucariaceae, and the Greek *-oides*, resembling, in reference to the perceived similarity between the leafy shoots of this plant and those of *Araucaria*

DESCRIPTION: *Shrub* to 1.5 m tall; bark rough, pale grey. *Branchlets* glabrescent, minutely squamose, sericeous-lanuginulose. *Leaves* ternate, 1.9–3.7 mm long, 0.8–1.4 mm wide, 2–3 times as long as wide, subsessile; blade glabrescent, lanuginulose-puberulous, oblong, narrowly elliptic or narrowly ovate, in transverse section shallowly lunate or transversely semielliptic, the base narrowly cuneate to rounded, the apex acute to rounded or obtusely shortly acuminate, the veins longitudinal, 3, *oil glands* obscure, more or less in rows. *Inflorescences* spicate, pseudoterminal (or commonly determinate in male inflorescences), with 2–17 monads, up to 14 mm wide. *Hypanthium* glabrous, 0.8–1.2 mm long. *Calyx lobes* abaxially glabrous, 0.5–0.8 mm long, herbaceous to (or almost to) the margin or scarious in a narrow marginal band c. 0.5 mm wide. *Petals* deciduous, 1–1.3 mm long. *Stamens* 3–5 per bundle; filaments cream, 1.8–5 mm long, the bundle claw 0.8–1.4 mm long, 0.3–0.4 times as long as the filaments. *Style* 4.5–5.5 mm long. *Ovules* c. 20 per locule. *Fruit* 2.5 mm long, with sepaline teeth; cotyledons planoconvex (approaching planoconvex).

Natural occurrence: Western Australia: the Ongerup – Cape Riche – Jerramungup district.

ECOLOGY: Recorded as occurring in open eucalypt woodland, dense heathland, tall shrubland, on gravelly sand, rocky loam over shale, and shallow red loamy clay.

FLOWERING TIME: Recorded as flowering from July to October.

ESSENTIAL OILS: This species produced a monoterpenoid leaf oil. The principal component was α-pinene (57.1%) and this was accompanied by lesser amounts of 1,8-cineole (25.8%), β-pinene (3.2%), limonene (2.8%), α-terpineol (2.3%) and trans-pinocarveol (1.2%). Sesquiterpenes were neither numerous nor plentiful. The main members were spathulenol (1.7%), globulol (0.8%) and viridiflorol (0.3%).

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

NOTES: The unusual leaf arrangement and small white flower heads combine to make this species worth experimenting with as an ornamental for Mediterranean climates. Holliday (2004) reported it has succeeded in Adelaide, South Australia.

Melaleuca arcana S.T.Blake

PUBLICATION: *Contributions from the Queensland Herbarium* 1: 54, figs 10, 15J (1968)

DERIVATION: *arcana*, from the Latin *arcanus*, secret, mysterious, in reference to the apparent rarity of the species

DESCRIPTION: *Tree or shrub* 0.4–15 m tall; bark papery, whitish. *Branchlets* hairy to glabrescent, sericeous. *Leaves* alternate, 23–75 mm long, 7–26 mm wide, 2–5.5 times as long as wide, long-petiolate to short-petiolate; blade glabrescent, sericeous, elliptic, obovate, narrowly to broadly elliptic or narrowly to broadly obovate, in transverse section transversely linear or oblunate, the base attenuate, the apex usually obtuse (sometimes acute, rounded, obtusely shortly acuminate or retuse), the veins longitudinal, 5–11, *oil glands* moderately dense, obscure, scattered. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 5–11 triads, up to 18 mm wide. *Hypanthium* hairy, 1.4–1.6 mm long. *Calyx lobes* abaxially glabrous, 0.9–1 mm long, scarious in a marginal band 0.15–3 mm wide. *Petals* deciduous, 1.5–2 mm long. *Stamens* 6–9 per bundle; filaments white, 5–5.5 mm long, the bundle claw 0.8–1.5 mm long, 0.2 times as long as the filaments. *Style* c. 6 mm long. *Ovules* 25–40 per locule. *Fruit* 2.5–4 mm long, the calyx lobes deciduous or rarely persistent; cotyledons obvolute.

NATURAL OCCURRENCE: Queensland: from the tip of Cape York Peninsula south to the Cooktown district.

ECOLOGY: Recorded as occurring in tall lowland swamp forest, *Acacia* thicket, heath, shrubland, and on sand.

FLOWERING TIME: Recorded as flowering from January to November.

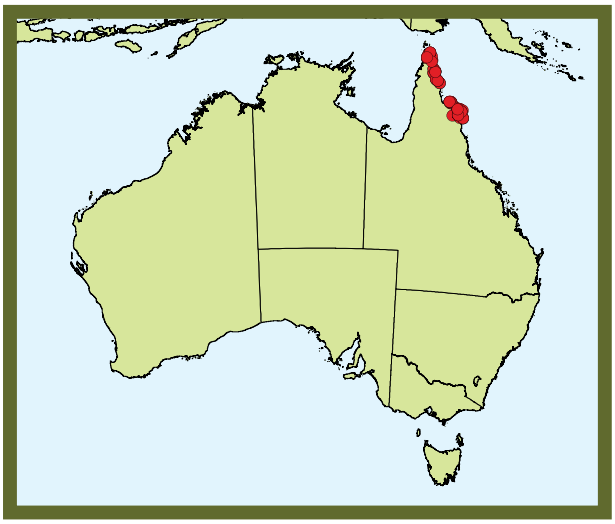
ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. It appeared to exist in two chemical forms. The principal compounds in the first form were α-pinene (26–51%) and 1,8-cineole (10–39%). These were accompanied by lesser amounts of limonene (4–6%), sabinene (0.2–7.0%), β-pinene (1–3%), γ-terpinene (0.7–7.0%), terpinen-4-ol (0.3–8.0%, this in the bulk sample) and α-terpineol (2–7%). Sesquiterpenes, while numerous, did not contribute much to the oil, with the major components being germacrene-D (1–2%), δ-cadinene (2–4%) and α-cadinol (0.7–2.0%). The second chemical form contained terpinen-4-ol (23–31%) as principal component, with significant amounts of 1,8-cineole (2–27%), α-pinene (5–12%), limonene (5–6%), γ-terpinene (4–8%), p-cymene (3–8%) and α-terpineol (3–7%). Once again, sesquiterpenes did not contribute much to the oil.

OIL YIELD: The oil yield (fresh weight, w/w) was 0.6–1.0%.

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

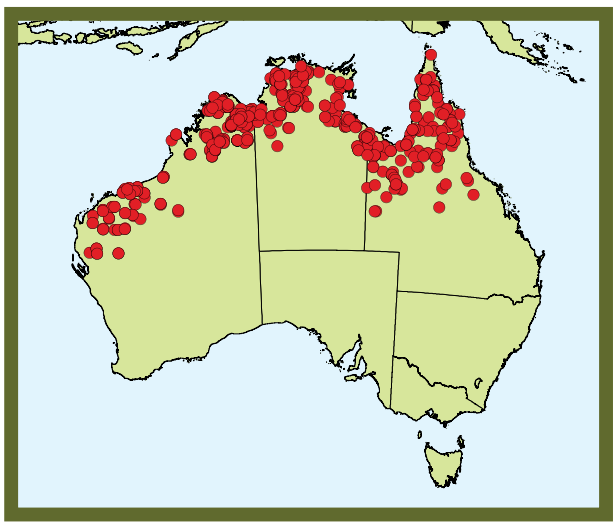
NOTES: This species has attractive foliage but, as noted by Wrigley and Fagg (1993), the flowers are not noteworthy. Should hybrids between red-flowered forms of *M. nervosa* or *M. viridiflora* be successful, it might be possible to combine the desirable foliage of *M. arcana* with red flowers from another species and thus produce plants of horticultural merit for tropical environments.

The chemotype containing significant amounts of terpinen-4-ol is interesting, though the oil yield would have to be improved.



Melaleuca argentea W.Fitzg.

PUBLICATION: *Journal and Proceedings of the Royal Society of Western Australia* 3: 187 (1918)
DERIVATION: *argentea*, from the Latin *argenteus*, silvery, in reference to the typically sivery colour of the foliage
DESCRIPTION: *Tree or shrub* 3–45 m tall; bark papery, white, creamy grey or reddish. *Branchlets* hairy to glabrescent (rarely glabrous), sericeous. *Leaves* alternate, 53–130 mm long, 7–24 mm wide, 5–14 times as long as wide (often 7–14), long-petiolate; blade hairy to glabrescent (rarely subglabrous), sericeous, very narrowly elliptic, very narrowly ovate, narrowly elliptic or falcate, in transverse section transversely linear (to slightly oblunate), the base attenuate, the apex narrowly acute, narrowly acuminate, acute or acuminate, the veins longitudinal, 5–9, *oil glands* moderately dense to dense, obscure to distinct, scattered. *Inflorescences* spicate, pseudoterminal or interstitial and often also upper axillary, with 5–20 triads, up to 30 mm wide. *Hypanthium* hairy, 1.3–2.3 mm long. *Calyx lobes* abaxially hairy, 1.1–1.5 mm long, scarious in a band 0.1–0.3 mm wide. *Petals* deciduous, 2.6–3.2 mm long. *Stamens* 7–9 per bundle; filaments white, creamy-yellow or creamy-green, 8–10 mm long, the bundle claw 1.2–1.8 mm long, 0.2 times as long as the filaments. *Style* 9.5–14 mm long. *Ovules* c. 50–60 per locule. *Fruit* 2.5–4 mm long, the calyx lobes deciduous; cotyledons obvolute.



NATURAL OCCURRENCE: Western Australia, Northern Territory, Queensland: from the Gascoyne River district in Western Australia eastwards to the northern part of the Northern Territory and northern Queensland.
ECOLOGY: Recorded as occurring in gallery forest, along stream lines, on sand, white clay, brown silty clay, and coarse sand among granite boulders.
FLOWERING TIME: Recorded as flowering from January to November.
ESSENTIAL OILS: This species presented a variable oil but, for the most part, monoterpenes predominated. One sample (BVG 2307) contained α-pinene (3–10%), 1,8-cineole (2–15%), γ-terpinene (7–10%), sabinene (6–19%) and terpinen-4-ol (13–18%) as major compounds. A second sample (BVG 2251) showed α-pinene (10–15%), limonene (18–30%), 1,8-cineole (3–12%), γ-terpinene (3–11%) and terpinolene (3–12%) as major components. While a third sample (GJM 1719) gave a sesquiterpenic oil, with several samples containing E-nerolidol (88–92%) as principal component and another sample containing 1,8-cineole (26%), bicyclogermacrene (12%), globulol (10%), viridiflorol (8%) and spathulenol (10%) as major components.
OIL YIELD: The oil yield (dry weight, w/w) was 0.1–1.2%.
REFERENCE ON ESSENTIAL OILS: Brophy and Doran 1996
NOTES: *Melaleuca argentea* is a characteristic riparian tree along the larger streams in monsoonal northern Australia and its silvery foliage readily permits its distinction from the other common riparian species of the genus, *M. leucadendra*. Where conditions permit, it often is rheophytic. The species is well-suited for planting in parks, road verges etc. in tropical and subtropical regions. The existence of forms containing high amounts of E-nerolidol are worthy of note, though a good oil yield would be needed before commercial cultivation could be undertaken.

The populations in the Pilbara region, Western Australia, may be separated as a distinct species as a result of DNA studies by Robert Edwards (pers. comm.).

Melaleuca armillaris (Sol. ex Gaertn.) Sm.

TAXONOMY: Two subspecies are recognised within this species: subsp. *akineta* F.C.Quinn and subsp. *armillaris*
PUBLICATIONS: *Australian Systematic Botany* 3: 188, fig. 9b (1990), subsp. *akineta; Transactions of the Linnean Society of London* 3: 277 (1797), subsp. *armillaris*
DERIVATION: *akineta*, from the Greek *akinetos*, not moving, in reference to its apparently relictual distribution in South Australia; *armillaris*, from the Latin *armilla*, bracelet, apparently in reference to a perceived resemblance of the inflorescence or infructescence to a bracelet
DESCRIPTION: ***Shrub or tree*** 1.2–4 m tall; bark papery or fibrous, whitish or greyish-white. ***Branchlets*** soon glabrescent (the lanuginulose hairs ephemeral). ***Leaves*** decussate, 4.5–19 mm long, 0.8–4 mm wide, 2.5–18 times as long as wide, short-petiolate to subsessile; blade soon glabrescent (the lanuginulose hairs ephemeral), linear, oblong, narrowly elliptic, elliptic, narrowly ovate or ovate, in transverse section lunate, conduplicate-involute or transversely linear, the base attenuate to rounded, the apex acuminate, narrowly acute or narrowly acuminate, the veins weakly pinnate (superficially appearing to have 3 longitudinal veins), ***oil glands*** sparse, distinct to obscure, scattered. ***Inflorescences*** spicate, lateral (often developing on older wood), with 1–8 monads, 6–20 mm wide. ***Hypanthium*** glabrous, 1.2–2.7 mm long. ***Calyx lobes*** abaxially glabrous, 0.5–1.4 mm long, scarious in a marginal band 1–2 mm wide. ***Petals*** deciduous, 1.5–3 mm long. ***Stamens*** 8–18 per bundle; filaments white or cream (rarely yellowish), 4–7.5 mm long, the bundle claw 3–4.9 mm long, 0.6–0.7 times as long as the filaments. ***Style*** 5.1–7.3 mm long. ***Ovules*** 40–80 per locule. ***Fruit*** 2.3–4.5 mm long, with sepaline teeth or the calyx lobes weathering away or rarely persistent; cotyledons planoconvex to subobvolute.

NATURAL OCCURRENCE: **subsp. *akineta*:** South Australia: from the Lake Gairdner district south to the Darke Peak district. **subsp. *armillaris*:** New South Wales, Victoria, Tasmania: from the Manning River district in coastal New South Wales south to far-eastern Victoria, extending to islands of Bass Strait. Naturalised locally in south-western Western Australia, south-eastern South Australia, Victoria and the Australian Capital Territory.

ECOLOGY: **subsp. *akineta*:** Recorded as occurring on ridges and granite inselbergs. **subsp. *armillaris*:** Recorded as occurring in open coastal heathlands, dense thickets along cliff tops, on headlands, and on a flat sandstone plateau.

FLOWERING TIME: **subsp. *akineta*:** Recorded as flowering from September to October. **subsp. *armillaris*:** Recorded as flowering from April to December.

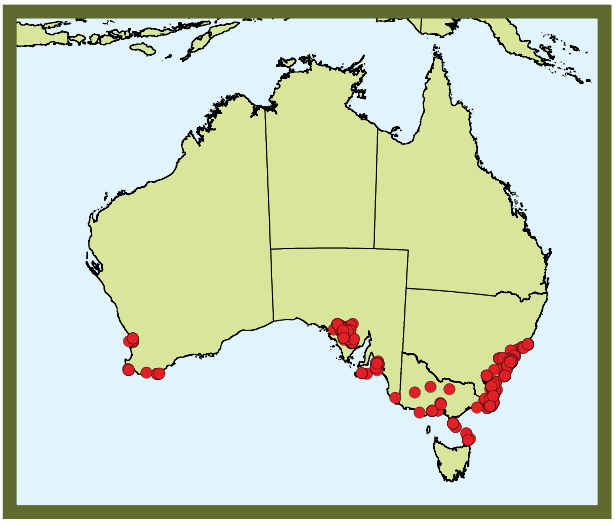
ESSENTIAL OILS: **subsp. *akineta*:** The leaf oil of this subspecies was dominated by monoterpenes. The principal component was 1,8-cineole (72–79%). This was accompanied by lesser amounts of α-pinene (4–6%), limonene (8–9%), β-pinene (1–2%) and α-terpineol (4–6%). The principal sesquiterpenes were globulol, spathulenol and aromadendrene (all <0.6%). **subsp. *armillaris*:** The leaf oil of this subspecies was dominated by monoterpenes, with 1,8-cineole (66–73%) being the most prominent component. Other components found in the oil in lesser amounts were limonene (5–9%), α-pinene (1–5%), myrcene (1–2%), terpinen-4-ol (1–3%) and α-terpineol (3–4%). Sesquiterpenes contributed little to the oil, with the most prominent members being β-caryophyllene (1–3%), aromadendrene (0.2–2.0%), δ-cadinene (0.7–2.0%) and globulol (0.3–2.0%).

OIL YIELD: **subsp. *akineta*:** The oil yield (fresh weight, w/w) was 0.6%. **subsp. *armillaris*:** The oil yield (fresh weight, w/w) was 0.1–0.3%.

REFERENCE ON ESSENTIAL OILS: Brophy and Lassak 1983

NOTES: The two subspecies are distinguished as follows: **subsp. *akineta*:** Leaf blade with oil glands scattered. **subsp. *armillaris*:** Leaf blade with oil glands in rows or more or less so.

Melaleuca armillaris subsp. *armillaris* is widely planted in southern Australia for shelter belts, road verge plantings etc. It is not especially showy and in domestic gardens is mainly useful for providing a fast-growing screen. This subspecies can become naturalised and is weedy in some places, notably in the south-west of Western Australia and the south-west of Victoria.



Melaleuca aspalathoides Schauer

PUBLICATION: in Lehmann, *Plantae Preissianae* 1: 140 (1844)

DERIVATION: *aspalathoides*, from *Aspalathus*, a genus of Fabaceae, and the Greek *-oides*, resembling, in reference to the similarity between the foliage of this plant and that of some species of *Aspalathus*

DESCRIPTION: *Shrub* 0.2–1.5 m tall. *Branchlets* hairy (at length glabrescent), with dense lanuginulose to lanuginulose-puberulous and sericeous-lanuginulose hairs overlaid with fairly dense appressed to ascending (rarely to spreading), sericeous to sericeous-pubescent or (rarely) pubescent hairs. *Leaves* alternate, 7–28 mm long, 0.6–1.3 mm wide, 9–30 times as long as wide, sessile to subsessile; blade hairy or rarely glabrescent, the hairs as on the branchlets, linear to linear-obovate, in transverse section depressed obovate, subcircular to circular or transversely elliptic (rarely more or less rounded depressed obtriangular), the base truncate or parallel (blade width equals petiole width), the apex narrowly acute to obtuse, the veins longitudinal, 3, *oil glands* moderately dense to dense, distinct, scattered. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 2–5 triads, up to 30 mm wide. *Hypanthium* hairy, 2.5–4 mm long. *Calyx lobes* abaxially hairy, 1.6–4 mm long, herbaceous to the margin or scarious in a marginal band up to c. 0.2 mm wide. *Petals* caducous (rarely tardily so), 2.5–4 mm long. *Stamens* 8–12 per bundle; filaments purple, pink or mauve, 10.5–21.5 mm long, the bundle claw 4.5–8.5 mm long, 0.3–0.5 times as long as the filaments. *Style* 17.5–22 mm long. *Ovules* 15–20 per locule. *Infructescences* peg-fruited. *Fruit* 3–5 mm long, the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: from the Mingenew–Eneabba district south to the Brookton–Tammin district.

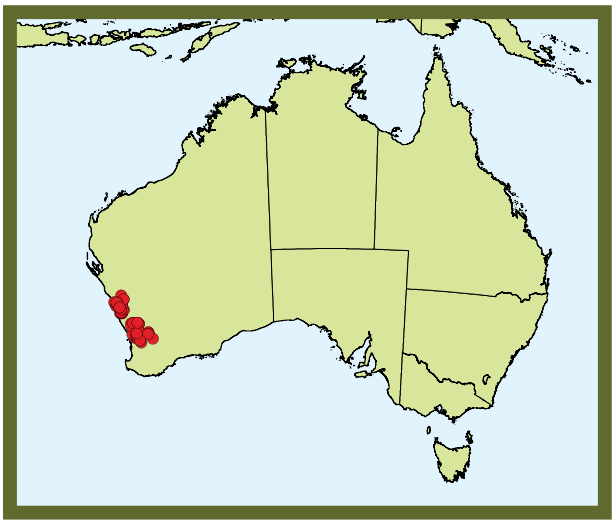
ECOLOGY: Recorded as occurring in heathy woodland, dense heath with some mallee, low closed heath, on sand plain, sand over granite and laterite, and sand over clay.

FLOWERING TIME: Recorded as flowering from January to December.

ESSENTIAL OILS: The leaf oil of this species contained both mono- and sesquiterpenes in approximately equal amounts. The principal monoterpenes were 1,8-cineole (19–33%) and α-pinene (9–15%). These were accompanied by lesser amounts of limonene (0.6–2.0%) and α-terpineol (2–4%). The principal sesquiterpenes identified in the oil were spathulenol (9–15%), globulol (5–8%), viridiflorol (5–9%), bicyclogermacrene (1–3%) and β-elemene (0.7–2.0%). There was a considerable number of sesquiterpenes, comprising about 20% of the oil, that have not been identified.

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

NOTES: This species should be trialled as an ornamental in regions with a Mediterranean climate as the brightly coloured flowers contrast well with the silvery grey foliage.



Melaleuca ***atroviridis*** Craven & Lepschi

PUBLICATION: in Craven, Lepschi, Broadhurst & Byrne, *Australian Systematic Botany* 17: 259 (2004)

DERIVATION: *atroviridis*, from the Latin *ater*, black and *viridis*, green, in reference to the commonly dark green foliage of this species

DESCRIPTION: *Tree or shrub* to 12 m tall; bark papery, flaking. *Branchlets* glabrescent, sericeous or sericeous-pubescent. *Leaves* spreading-ascending, 22–56 mm long, 0.6–1.4 mm wide, 28–55 times as long as wide, petiole 0.2–0.6 mm long; blade glabrescent, sericeous or sericeous-pubescent, linear, in transverse section circular, subcircular, transversely narrowly elliptic or depressed obovate, in lateral view incurved or straight, the base very narrowly cuneate or parallel, the apex narrowly acute, narrowly acuminate or aristate, *oil glands* scattered. *Inflorescences* spicate, with 5–27 triads. *Hypanthium* 0.8–1 mm long, 0.9–1.4 mm wide. *Calyx lobes* 5 (rarely 4), distinct or connate, abaxially glabrous, 0.2–0.5 mm long. *Petals* caducous, broadly obovate, 1.3–1.6 mm long. *Stamens* 7–11 per bundle, the filaments yellow, lemon or cream, 2–3.7 mm long, the bundle claw 1.8–3 mm long, 0.6–1.0 times as long as the filaments. *Style* 2.5–3.3 mm long. *Ovules* 9–11 per locule. *Infructescences* longer than wide, 5.4–8.5 mm wide, the constituent fruits closely packed and not retaining a significant separate identity (the fruiting hypanthia closely packed for their full length). Seeds 0.5–0.9 mm long, the cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: from the Coorow – Perenjori – Lake Moore – Yellowdine district southwards to the Beaufort River – Pingrup – Varley district.

ECOLOGY: Recorded as occurring in eucalypt–*Melaleuca* woodland, *Melaleuca* shrubland, with *Eucalyptus sargentii* and chenopods, with *Eucalyptus–Casuarina–Melaleuca* and samphire, on light brown loamy sand just above samphire flat, red clayey sand over laterite pan, red-brown clayey sand over granite, on light brown sandy clay, on grey clayey sand on fringe of salt pan, on brown loamy sand in broad saline drainage line, skeletal soil over granite, and hard-setting grey clay.

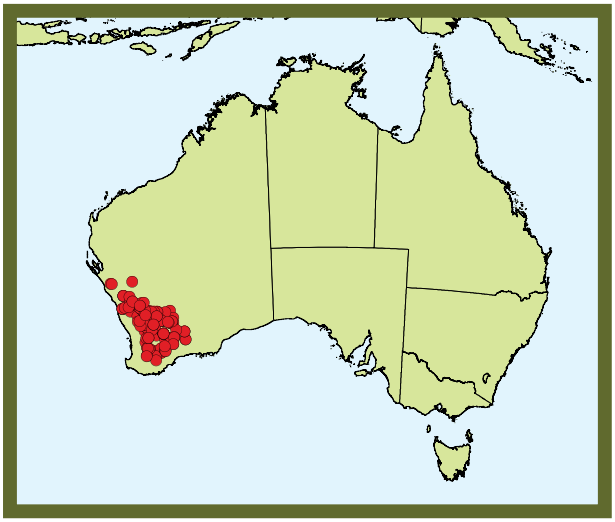
FLOWERING TIME: Recorded as flowering usually between December and February.

ESSENTIAL OILS: The leaf oil from both sprouting and non-sprouting forms of this species (see 'Notes' below) was dominated by monoterpenes. The principal monoterpene was 1,8-cineole (34–74%). This was accompanied by lesser amounts of α-pinene (4–35%, the majority <24%), limonene (2–6%), terpinen-4-ol (0.2–2.0%) and α-terpineol (0.6–5.0%). Sesquiterpenes did not contribute much to the leaf oil, with the major compounds being spathulenol (0.3–3.0%), globulol (1–3%) and α-, β- and γ-eudesmol (from one site, each 0.1–5.0%).

OIL YIELD: The oil yields (fresh weight, w/w) were 0.3–1.0% for one sample (WOS 2139) and 2.5–3.3% for another (WOS 2118).

REFERENCE ON ESSENTIAL OILS: Brophy et al. 2006b

NOTES: *Melaleuca atroviridis* commonly is found on the margins of saline country low in the landscape in south-western Western Australia. This may be an artefact caused by secondary salinity, reflecting the species' greater tolerance to salt than the other species in the original vegetation. The species is not restricted to such saline habitats and also occurs in winter-wet, freshwater habitats, and on well-drained sites high in the landscape. It seems the low landscape populations are 'seeders', not re-sprouting from the base of the plant after events such as fire or brush-cutting but recruiting new plants from seed stored on the killed individuals. Populations occurring higher in the landscape, whether on sand plains or low hills, appear to be 'sprouters', with cut plants regrowing from the base. Geoff Cockerton (pers. comm.) reports that both seeding and sprouting forms are included in a large plantation of this species in Western Australia that has been established for brushwood production for making fencing.



Melaleuca ***barlowii*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 861 (1999)

DERIVATION: *barlowii*, in honour of Bryan Alwyn Barlow (1933–), a specialist in Old World Loranthaceae and the initiator of *Melaleuca* studies in Canberra, Australia

DESCRIPTION: *Shrub* 0.4–2.6 m tall. *Branchlets* soon glabrescent (the sericeous to sericeous-pubescent hairs ephemeral). *Leaves* alternate, 19.5–41 mm long, 3–8.5 mm wide, 4–10 times as long as wide, subsessile to short-petiolate; blade glabrescent (the sericeous to rarely sericeous-pubescent hairs ephemeral), narrowly ovate, narrowly elliptic, very narrowly ovate or very narrowly elliptic, in transverse section transversely linear or shallowly lunate, the base attenuate to narrowly cuneate, the apex acuminate, the veins pinnate, longitudinal-pinnate or longitudinal (when longitudinal, the veins 3 – c. 5), *oil glands* dense to moderately dense, distinct to obscure, scattered. *Inflorescences* capitate or shortly spicate, pseudoterminal and sometimes also upper axillary, with 10–15 triads, up to 30 mm wide. *Hypanthium* hairy, 1.5–1.8 mm long. *Calyx lobes* abaxially glabrous, 0.4–0.7 mm long, scarious in a marginal band 0.2–0.3 mm wide. *Petals* deciduous, 1.6–2.7 mm long. *Stamens* 9–11 per bundle; filaments mauve to purple, 7.3–11 mm long, the bundle claw 2–3.8 mm long, 0.3–0.4 times as long as the filaments. *Style* 8–12 mm long. *Ovules* c. 10–15 per locule. *Infructescences* globose. *Fruit* 3.5–4 mm long, the calyx lobes weathering; cotyledons obvolute.

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

ECOLOGY: Recorded as occurring in *Acacia–Melaleuca* shrubland, low open shrubland, disturbed mallee–*Acacia–Melaleuca* woodland, in heath dominated by *Allocasuarina* and melaleucas, on lateritic light red sand plain, on lateritic yellow soil, and on hard, gravelly sandy clay loam.

FLOWERING TIME: Recorded as flowering in November and December.

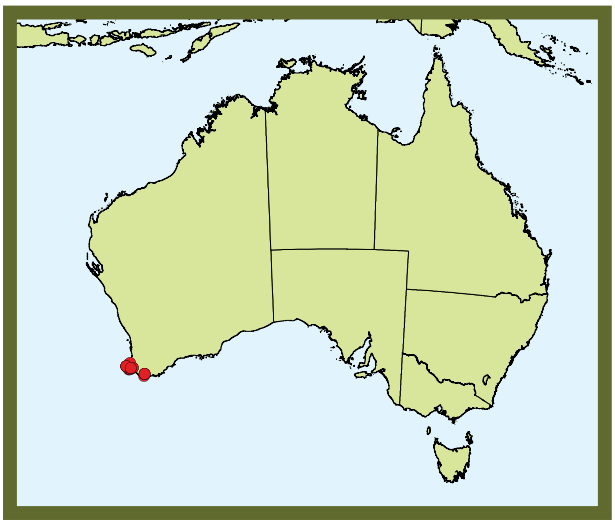
ESSENTIAL OILS: The leaf oil of this species contained a majority of monoterpenes. The principal monoterpenes encountered were β-pinene (20.1%), 1,8-cineole (19.3%) and α-pinene (9.5%). These were accompanied by lesser amounts of limonene (2.6%) and α-terpineol (4.0%). The principal sesquiterpenes were globulol (5.5%), viridiflorol (4.1%), bicyclogermacrene (2.8%), β-caryophyllene (1.1%), cubeban-11-ol (2.1%) and α-cadinol (1.8%).

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

Melaleuca ***basicephala*** Benth.

PUBLICATION: *Flora Australiensis* 3: 133 (1867)
DERIVATION: *basicephala*, from the latinised Greek *basis*, base, and *-cephalus*, headed, in reference to the inflorescences usually being at the base of lateral shoots
DESCRIPTION: *Shrub* to 0.6 m tall. *Branchlets* glabrous. *Leaves* decussate, 8–12.5 mm long, 1.8–2.5 mm wide, 4–6 times as long as wide, short-petiolate to subsessile; blade glabrous, narrowly elliptic or narrowly obovate, in transverse section transversely linear, the base narrowly cuneate or attenuate, the apex narrowly acute to acute, the veins longitudinal, 3, *oil glands* moderately dense, distinct, scattered. *Inflorescences* capitate, usually proximal on secondary shoots or rarely a lateral cluster, interstitial or pseudoterminal, with 2–10 monads, up to 10 mm wide. *Hypanthium* glabrous, 0.8–1.1 mm long. *Calyx lobes* abaxially glabrous, c. 0.8 mm long, herbaceous to the margin. *Petals* deciduous, 1.4–2.2 mm long. *Stamens* 17–23 per bundle; filaments pinkish-purple or mauve-pink, 3.5–4.8 mm long, the bundle claw 0.8–1.5 mm long, 0.5 times as long as the filaments. *Style* c. 5.5 mm long. *Ovules* 30–40 per locule. *Fruit* 3 mm long, with sepaline teeth or the calyx lobes weathering away; cotyledons planoconvex.
NATURAL OCCURRENCE: Western Australia: from the Augusta district to the Northcliffe district.
ECOLOGY: Recorded as occurring in dense freshwater swamps, in drainage line on flat, in *Leptocarpus* sedgeland, on sandy clay, and brown clay loam.

FLOWERING TIME: Recorded as flowering from November to February.
ESSENTIAL OILS: This species presented a monoterpenoid oil, with the principal component being 1,8–cineole (65.4%). This was accompanied by lesser amounts of α-pinene (2.4%), limonene (3.5%), α-terpineol (1.3%), β-pinene (0.9%) and myrtenol (0.9%). Sesquiterpenes did not contribute greatly to the oil, with the principal members being β-caryophyllene (3.3%), viridiflorene (1.5%), spathulenol (1.8%) and viridiflorol (0.9%),
OIL YIELD: The analysis was performed on 0.2 g of an 8-year-old air-dried herbarium sample and as a result there is no oil yield given.



Melaleuca ***beardii*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 862 (1999)

DERIVATION: *beardii*, in honour of John Stanley Beard (1916–2011), a phytogeographer of the Western Australian flora

DESCRIPTION: *Shrub* 1–2.5 m tall. *Branchlets* glabrescent, pubescent or rarely the hairs lanuginose-pubescent to more or less lanuginose. *Leaves* alternate, 4.8–10.5 mm long, 0.6–0.8 mm wide, 6–13 times as long as wide, subsessile; blade glabrescent, with short pubescent hairs overlaid by sparser (and much longer) pubescent hairs, linear-obovate or linear, in transverse section transversely elliptic, depressed obovate or subcircular, the base narrowly cuneate, rounded, attenuate or parallel (blade width equals petiole width), the apex rounded to obtuse, the veins longitudinal, 3, *oil glands* moderately dense, distinct or obscure, scattered to more or less in rows. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 3–6 triads, up to 25 mm wide. *Hypanthium* hairy, 2–2.5 mm long. *Calyx lobes* abaxially hairy (rarely subglabrous), 1–2.5 mm long, herbaceous to the margin or scarious in a marginal band 0.2–0.5 mm wide or scarious throughout. *Petals* deciduous, 2.3–3.5 mm long. *Stamens* 8–13 per bundle; filaments pink, purple or magenta, 9.5–11 mm long, the bundle claw 2.7–6.3 mm long, 0.3–0.6 times as long as the filaments. *Style* 10–13.5 mm long. *Ovules* c. 15 per locule. *Infructescences* peg-fruited. *Fruit* 3–5 mm long, the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Arrino–Gunyidi district.

ECOLOGY: Recorded as occurring in heathland, open scrubland, on sand plain.

FLOWERING TIME: Recorded as flowering from October to December.

ESSENTIAL OILS: The oil from this species was dominated by monoterpenes. The principal monoterpenes were α-pinene (54–60%) and 1,8-cineole (4–15%). These were accompanied by lesser amounts of β-pinene (2–3%), limonene (0.9–2.0%), p-cymene (1–5%) and α-terpineol (1–2%). The principal sesquiterpenes were globulol (3–5%), viridiflorol (2–4%), spathulenol (1–3%), bicyclogermacrene (4–6%) and viridiflorene (1–2%).

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

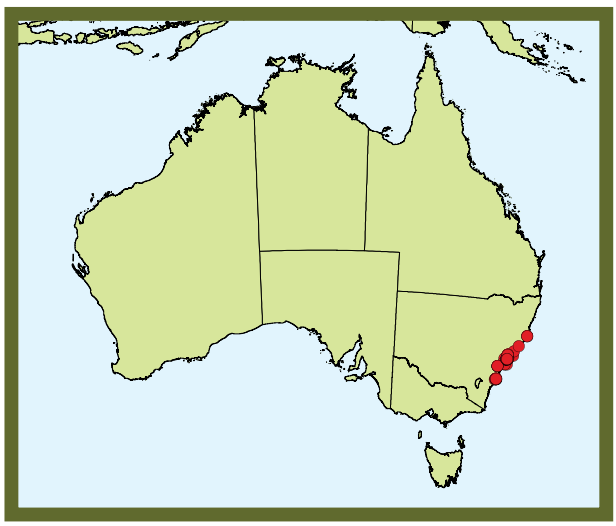
NOTES: This species is not known to be in cultivation but it should be trialled as an ornamental shrub in regions with Mediterranean climates for it is one of the taller growing of the *M. scabra* group of species and has particularly brightly coloured flowers.

Melaleuca ***biconvexa*** Byrnes

PUBLICATION: *Austrobaileya* 2: 74 (1984)

DERIVATION: *biconvexa*, from the Latin *bi-*, two, and *convexus*, convex, in reference to the biconvex shape of the leaves in transverse section

DESCRIPTION: *Tree or shrub* 3–8 m tall; bark fibrous to papery. *Branchlets* glabrescent, lanuginulose to lanuginulose-puberulous, or rarely sericeous-lanuginulose overlaid with a sparse layer of much longer pubescent hairs. *Leaves* decussate, 6.5–18 mm long, 2–4 mm wide, 2–5 times as long as wide, subsessile to short-petiolate; blade glabrescent, pubescent (to almost sericeous-pubescent) and usually with some shorter lanuginose-pubescent to lanuginulose-puberulous or lanuginulose hairs also, narrowly ovate or narrowly elliptic, in transverse section 'bird-winged', the base rounded or subcordate, the apex shortly acuminate or acute, the veins longitudinal, 3, *oil glands* moderately dense, distinct, scattered. *Inflorescences* spicate to capitate, pseudoterminal, with 2–10 monads, up to 17 mm wide. *Hypanthium* hairy, 1.3–2 mm long. *Calyx lobes* abaxially glabrous or glabrescent, 0.9–1.1 mm long, herbaceous to the margin or scarious in a marginal band up to 0.2 mm wide. *Petals* deciduous, 2.5–3.3 mm long. *Stamens* 10–20 per bundle; filaments cream to white, 5.8–9 mm long, the bundle claw 1.5–2.3 mm long, 0.2–0.3 times as long as the filaments. *Style* 10–12 mm long. *Ovules* 40–70 per locule. *Fruit* 3–4 mm long, with sepaline teeth; cotyledons planoconvex.



NATURAL OCCURRENCE: New South Wales: from the Port Macquarie district south to the Jervis Bay district.

ECOLOGY: Recorded as occurring in eucalypt forest, in low moist areas, on sandy soil on creek banks and on gravelly sand.

FLOWERING TIME: Recorded as flowering from August to October.

ESSENTIAL OILS: The leaf oil of this species contained more sesquiterpenes, both in number and in quantity, than monoterpenes. The principal sesquiterpenes were the hydrocarbons aromadendrene (2–4%), allo-aromadendrene (1–3%), viridiflorene (2–5%), β-selinene (2–5%), α-selinene (1–4%), δ-cadinene (0.8–3%), ledol (1–3%), globulol (3–5%), viridiflorol (17–18%), spathulenol (1–3%), γ-eudesmol (2–4%), α-eudesmol (2–5%) and β-eudesmol (4–8%). The main monoterpenes in this oil were 1,8-cineole (8–23%), limonene (1–3%), E-β-ocimene (2–4%), linalool (1–4%) and α-terpineol (1–5%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.4–0.8%.

Melaleuca ***bisulcata*** F. Muell.

PUBLICATION: *Fragmenta phytographiae Australiae* 3: 118 (1862)

DERIVATION: *bisulcata*, from the Latin *bi-*, two, and *sulcatus*, furrowed, grooved, in reference to the dried leaves of this species commonly having two longitudinal grooves

DESCRIPTION: *Shrub* 0.3–1.3 m tall. *Branchlets* glabrescent, pubescent. *Leaves* alternate, 4.8–7.2 mm long, 0.9–1.7 mm wide, 3–6 times as long as wide, short-petiolate to subsessile; blade glabrescent, pubescent to sericeous-pubescent, very narrowly obovate, narrowly obovate or very narrowly elliptic, in transverse section transversely semielliptic or shallowly lunate, the base narrowly cuneate to attenuate, the apex rounded to obtuse, the veins longitudinal, 3, *oil glands* moderately dense, distinct to obscure, more or less in rows. *Inflorescences* capitate, pseudoterminal, with 1–4 dyads or triads, up to 20 mm wide. *Hypanthium* hairy, 2–3.5 mm long. *Calyx lobes* abaxially glabrous, 0.8–2 mm long, scarious. *Petals* deciduous (rarely caducous), 2–4 mm long. *Stamens* 6–12 per bundle; filaments pink, purple or magenta, 7–11.5 mm long, the bundle claw 2.5–5 mm long, 0.2–0.5 times as long as the filaments. *Style* 10.5–15.5 mm long. *Ovules* 10–20 per locule. *Infructescences* peg-fruited. *Fruit* 4.8–6.5 mm long, with sepaline teeth or the calyx lobes (or teeth?) weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Kalbarri district.

ECOLOGY: Recorded as occurring in low heathland, eucalypt woodland with heath understorey, on sand plain, sand over laterite, sand over limestone, and rocky outcrops.

FLOWERING TIME: Recorded as flowering in September and October.

ESSENTIAL OILS: The leaf oil of this species was overwhelmingly monoterpenoid in character with linalool as the principal component. The two main components were linalool (55.3%) and α-pinene (30.7%). These were accompanied by lesser amounts of β-pinene (1.6%), myrcene (1.4%) and α-terpineol (0.7%); isoamyl isobutyrate (1.8%) was also present. The principal sesquiterpene identified was spathulenol (1.2%). There were lesser amounts of E-nerolidol (1.0%), globulol (0.6%) and viridiflorol (0.5%). But, in reality, sesquiterpenes accounted for <5% of the oil.

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

NOTES: This is another of the *M. scabra* group that should be trialled for ornamental purposes in Mediterranean climates. The linalool content of this species could make it useful for oil production if the oil yield could be increased.

Melaleuca ***blaeriifolia*** Turcz.

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

DERIVATION: *blaeriifolia*, from *Blaeria*, a genus of Ericaceae, and the Latin *folium*, leaf, in reference to the similarity between the foliage of this species and that of a species of *Blaeria*

DESCRIPTION: *Shrub* 0.8–2 m tall. *Branchlets* glabrous to glabrescent, puberulous when hairy. *Leaves* usually alternate or sometimes alternate and ternate, 1.8–6.6 mm long, 0.8–2.5 mm wide, 1.5–3.5 times as long as wide, subsessile to short-petiolate; blade glabrescent, puberulous, ovate, narrowly ovate, ovate-oblong or narrowly triangular, in transverse section depressed angular-obovate, semicircular, transversely linear, strongly depressed obtriangular or obtriangular, the base rounded to truncate, the apex acute to obtuse, the veins longitudinal, 3 or 1, *oil glands* sparse to moderately dense, distinct to obscure, scattered. *Inflorescences* spicate or capitate, lateral, with 10–30 monads, up to 18 mm wide. *Hypanthium* glabrous, 1–1.7 mm long. *Calyx lobes* abaxially glabrous, 0.8–1.1 mm long, scarious in a marginal band 0.1–0.2 mm wide. *Petals* deciduous, 1.7–2.3 mm long. *Stamens* 3–5 per bundle; filaments green or yellow, 6.5–7.7 mm long, the bundle claw 1.6–2 mm long, 0.2–0.3 times as long as the filaments. *Style* 8.5–9 mm long. *Ovules* 25–30 per locule. *Fruit* 4–5.5 mm long, with sepaline teeth; cotyledons obvolute to subobvolute.

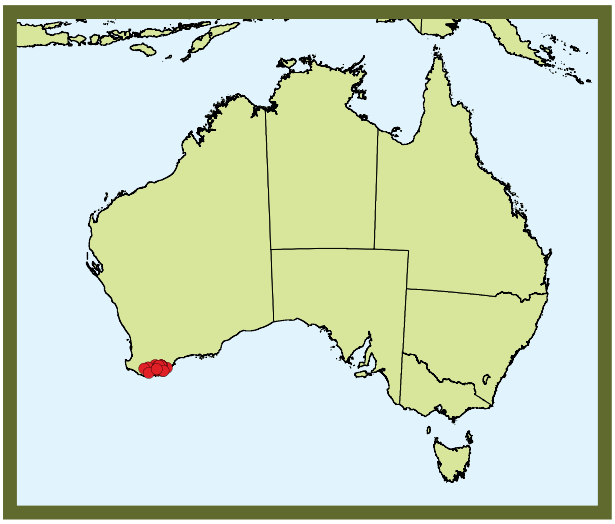
NATURAL OCCURRENCE: Western Australia: from the Manjimup district eastwards to the Pallinup River district.

ECOLOGY: Recorded as occuring in low heathland and shrublands, on gravelly sandy loam, peaty sandy clay over quartzite, and the edge of a granite slope.

FLOWERING TIME: Recorded as flowering from August to October.

ESSENTIAL OILS: This species produced a principally monoterpenoid oil. The principal monoterpenes encountered were α-pinene (10.2%) and 1,8-cineole (35%). These were accompanied by lesser amounts of β-pinene (2.2%), limonene (5.6%), E-β-ocimene (8.5%), linalool (3.8%) and α-terpineol (2.2%). The main sesquiterpenes encountered were bicyclogermacrene (6.5%), globulol (3.5%), viridiflorol (1.6%), β-caryophyllene (2%) and E,E-farnesol (1.4%).

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



Melaleuca ***boeophylla*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 863 (1999)

DERIVATION: *boeophylla*, from the Greek *boeos*, strap, and *phyllon*, leaf, in reference to the distinctive leaf shape of this species

DESCRIPTION: *Shrub* to 2 m tall. *Branchlets* glabrescent, sericeous to sericeous-pubescent and/or pubescent. *Leaves* alternate, 9.5–25 mm long, 1.2–1.7 mm wide, 6–10 times as long as wide, subsessile to sessile; blade glabrescent, sericeous to sericeous-pubescent and/or pubescent, linear-obovate, very narrowly obovate or linear, in transverse section transversely semielliptic, transversely narrowly elliptic or transversely narrowly oblong, the base parallel (blade width equals petiole width) or truncate, the apex rounded to obtuse, the veins longitudinal, 3, *oil glands* moderately dense, distinct, scattered. *Inflorescences* capitate, pseudoterminal or upper to median axillary, with 6–10 triads, up to 20 mm wide. *Hypanthium* hairy, 1–1.8 mm long. *Calyx lobes* abaxially glabrous, 0.5–0.8 mm long, scarious in a marginal band, 0.1–0.2 mm wide. *Petals* caducous, 1.7–2.5 mm long. *Stamens* 9–11 per bundle; filaments pink, 6–8 mm long, the bundle claw 1.2–2.2 mm long, 0.2–0.3 times as long as the filaments. *Style* 8–10 mm long. *Ovules* 10–20 per locule. *Infructescences* globose. *Fruit* 2.5–3 mm long, with poorly developed sepaline teeth or the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Kalbarri district.

ECOLOGY: Recorded as occurring in woodland on sand plain.

FLOWERING TIME: Recorded as flowering in November.

ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal components were β-pinene (30–43%), α-pinene (5–8%) and 1,8-cineole (10–20%). There were also lesser amounts of trans-pinocarveol (2–7%), α-terpineol (3–6%), limonene (1–2%), α-phellandrene (1–2%), myrtenal (1–4%) and pinocamphone (1–3%). Sesquiterpenes, though numerous, did not contribute much to the oil. The principal components were globulol (1–4%), spathulenol (2–4%) and α-, β-, and γ-eudesmol (each 0.3–2.0%).

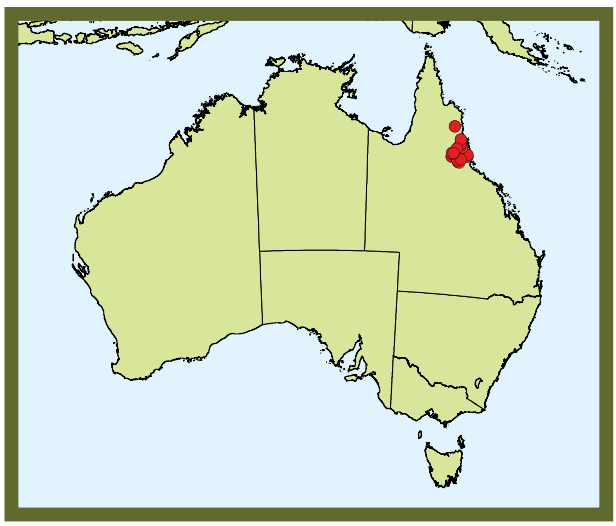
OIL YIELD: The oil yield (fresh weight, w/w) was 0.5–0.6%.

Melaleuca ***borealis*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 863 (1999)

DERIVATION: *borealis*, from the Latin *borealis*, northern, in reference to the distribution of this species being to the north of the related *M. nodosa*

DESCRIPTION: *Shrub or tree* 1–8 m tall; bark papery. *Branchlets* glabrescent, sericeous. *Leaves* alternate, 18–52 mm long, 0.5–0.8 mm wide, 20–75 times as long as wide, subsessile to short-petiolate; blade glabrescent, sericeous with some sericeous-pubescent to pubescent hairs also, linear, in transverse section transversely elliptic to subcircular, the base narrowly cuneate to attenuate or parallel (blade width equals petiole width), the apex narrowly acuminate or acuminate to narrowly acute, the veins longitudinal, 3, *oil glands* moderately dense or dense, obscure, scattered. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 3–8 triads, up to 17 mm wide. *Hypanthium* glabrous or glabrescent, 0.8–1.1 mm long. *Calyx lobes* abaxially glabrous, 0.2–0.6 mm long, scarious throughout or scarious in a marginal band 0.1–0.2 mm wide. *Petals* caducous, 1–1.3 mm long. *Stamens* 4–7 per bundle; filaments pale yellow or white, 3–8 mm long, the bundle claw 0.9–3.3 mm long, 0.2–0.5 times as long as the filaments. *Style* 5.5–6.5 mm long. *Ovules* 10–15 per locule. *Infructescences* globose. *Fruit* 1.5–2 mm long, the calyx lobes weathering away; cotyledons obvolute.



NATURAL OCCURRENCE: Queensland: the Lakeland Downs district south to the Valley of Lagoons district.

ECOLOGY: Recorded as occurring in shrubland, vine-forest country, heath, eucalypt–mixed woodland and monsoonal scrub on red basaltic soils, yellow-chocolate soils, siltstone with laterite, rhyolite, and a gravelly ridge.

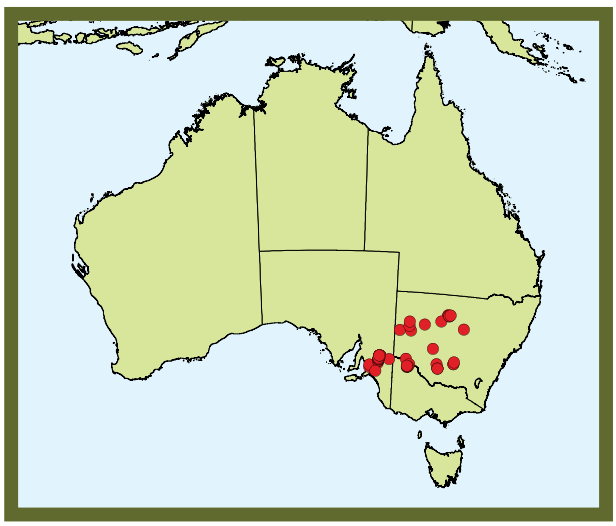
FLOWERING TIME: Recorded as flowering in November.

ESSENTIAL OILS: The leaf oil of this species contained significantly more monoterpenes than sesquiterpenes. The principal component was 1,8-cineole (50–57%) and this was accompanied by α-pinene (7–15%), limonene (5–8%) and α-terpineol (6–8%). No other monoterpene came above 1%. The principal sesquiterpenes in this oil were γ-eudesmol (1–7%), α-eudesmol (1–6%) and β-eudesmol (3–8%), as well as α-cadinol (2.3%) in the bulk collection.

OIL YIELD: The oil yield (dry weight, w/w) was 2.5–2.8%.

Melaleuca ***brachyandra*** (Lindl.) Craven

PUBLICATION: *Novon* 16: 471 (2006)
DERIVATION: *brachyandra*, from the Greek *brachy-*, short, and *-andrus*, male (hence stamen), in reference to the length of the stamens
SYNONYM: *Callistemon brachyandrus* Lindl.
DESCRIPTION: ***Shrub or tree*** 1.5–8 m tall; bark hard. ***Branchlets*** glabrescent, sericeous or (lanuginose) sericeous-pubescent overlaid with longer pubescent hairs. ***Leaves*** alternate, 18–61 mm long, 0.5–1.7 mm wide, 24–48 times as long as wide, subsessile or sessile; blade glabrescent, sericeous-pubescent, sericeous-pubescent overlaid with long sericeous-pubescent hairs or sericeous, linear, in transverse section subreniform, broadly subreniform or very broadly obovate to depressed obovate, the base narrowly cuneate, the apex narrowly acuminate, the veins longitudinal, 3, ***oil glands*** moderately dense, obscure or distinct, scattered. ***Inflorescences*** spicate, effectively pseudoterminal, with 7–36 monads, 22–35 mm wide. ***Hypanthium*** hairy or glabrescent, 2.2–3.4 mm long. ***Calyx lobes*** abaxially hairy or glabrescent, 1–1.8 mm long, scarious in a marginal band 0.3–0.7 mm wide. ***Petals*** deciduous, 2.8–4.9 mm long. ***Stamens*** 50–84 per flower; filaments red, 4.8–12 mm long; anthers yellow. ***Style*** 9–12.4 mm long. ***Ovules*** c. 150 per locule. ***Fruit*** 3.7–6 mm long, the calyx lobes deciduous; cotyledons flattened planoconvex.



NATURAL OCCURRENCE: South Australia, New South Wales, Victoria: the lower Murray River area of South Australia, widespread in western New South Wales and in the Murray River area of north-western Victoria.
ECOLOGY: Recorded as occurring in river flats, open shrubland on flat riverine flood plain, among rocks along creek bed, and on sand.
FLOWERING TIME: Recorded as flowering from September to January.
ESSENTIAL OILS: There was virtually no oil produced by this species. The very small amount of oil available for analysis was sesquiterpenoid but no identifications were made. Phytol was also detected.
OIL YIELD: The oil yield (fresh weight, w/w) was only a trace amount.
REFERENCE ON ESSENTIAL OILS: Brophy et al. 1998, as *Callistemon brachyandrus*
NOTES: Despite the prickly nature of the leaves, this species is well suited as an ornamental shrub in areas with a dry temperate climate as the flowers are very showy.

Melaleuca ***bracteata*** F.Muell.

PUBLICATION: *Fragmenta phytographiae Australiae* 1: 15 (1858)

DERIVATION: *bracteata*, from the Latin, *bractea*, bract, in reference to the inflorescence bracts

DESCRIPTION: ***Tree or shrub*** 1–22 m tall; bark hard-fibrous, grey to black. ***Branchlets*** glabrescent to hairy, puberulous to pubescent. ***Leaves*** alternate, 3.4–22 mm long, 0.8–4.5 mm wide, 1.5–16 times as long as wide, sessile; blade glabrescent to hairy, pubescent or puberulous, narrowly ovate, very narrowly ovate, narrowly elliptic, subulate or ovate, in transverse section transversely linear, sublunate or transversely narrowly elliptic, the base cuneate, the apex narrowly acute or acuminate, the veins longitudinal, 3–11, ***oil glands*** moderately dense, distinct to obscure, more or less in rows. ***Inflorescences*** spicate, pseudoterminal or occasionally interstitial, with 6–16 monads or triads (sometimes monads and triads occur in the same inflorescence), up to 20 mm wide. ***Hypanthium*** hairy or rarely glabrescent, 1.7–2 mm long. ***Calyx lobes*** abaxially hairy or rarely glabrous, costate, 0.9–1.7 mm long, scarious in a marginal band up to c. 1 mm wide. ***Petals*** caducous, 1.8–1.9 mm long. ***Stamens*** 15–28 per bundle; filaments white, creamy-white to cream or greenish, 6–8.3 mm long, the bundle claw 2.4–4.4 mm long, 0.4–0.6 times as long as the filaments. ***Style*** 6.3–8.7 mm long. ***Ovules*** c. 30 per locule. ***Fruit*** 1.5–2 mm long, the calyx lobes relatively persistent (at length weathering away); cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia, Northern Territory, South Australia, Queensland, New South Wales: from the Pilbara and Kimberley regions of Western Australia, east and southwards to the central and southern parts of the Northern Territory, north-western South Australia, northern and south-eastern Queensland and north-eastern New South Wales.

ECOLOGY: Recorded as occurring in open forest, deciduous vine forest, *Melaleuca* woodland, mixed scrub, riverine woodland, on basalt plain, reddish-brown loam over trachyte, sandy soil, and limestone creek bed.

FLOWERING TIME: Recorded as flowering from March to December.

ESSENTIAL OILS: This species occurred in basically four aromatic chemotypes. Chemotype I contained elemicin (57%) as the principal component. This was accompanied by lesser amounts of β-caryophyllene (21%) and E-isoelemicin (6%). Chemotype II contained E-isoelemicin (46%) as the principal component and lesser amounts of elemicin (9%), β-caryophyllene (7%), α-phellandrene (13%) and α-pinene (5%). Chemotype III contained E-methyl isoeugenol (76%) as the principal component, with lesser amounts of methyl eugenol (18%) and E-methyl cinnamate (3%). Chemotype IV contained methyl eugenol (84%) as the major component, with a lesser amount of E-methyl cinnamate (9%). It has also been found to occur rarely in a non-aromatic form in which major components were caryophyllene oxide (4–17%), 1,8-cineole (0.2–11.0%), β-pinene (6–18%) and α-pinene (4–12%).

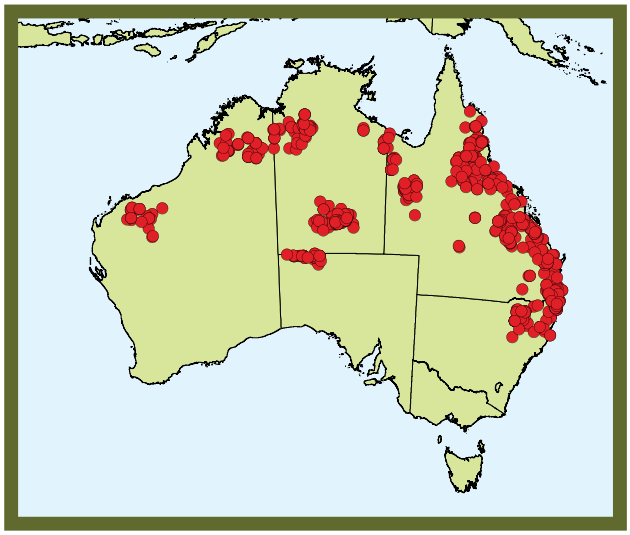
OIL YIELD: The oil yield (fresh weight, w/w) was 0.1–1.5% for the aromatic chemotypes and 0.1–0.2% for the terpenoid samples.

REFERENCES ON ESSENTIAL OILS: Masunga 1998; Brophy 1999; Brophy et al. 1999

NOTES: This species has proved to be hardy in many climates and soil types in Australia. Well suited for shelter belts, or for screening purposes in large gardens, it also is useful in parks and roadside plantings. A yellow-foliaged selection, 'Revolution Gold', is a useful landscaping plant where colour contrasts are required.

This species could be a useful source of aromatic ethers, but the oil yield would have to be increased. As mentioned in Chapter 3, *M. bracteata* would be a potential source of betaines for use on agricultural crops.

A new species, related to *M. styphelioides*, *M. bracteata* and *M. squamophloia*, was discovered in 2012 in the Ravenshoe district, Queensland. This will be named *M. lophocoracorum*. It differs from its three relatives, inter alia, in details of the calyx, stamens and essential oil chemistry.



Melaleuca ***bracteosa*** Turcz.

PUBLICATION: *Bulletin de la classe physico-mathématique de l'Académie Impériale des Sciences de Saint-Pétersbourg* 10: 340 (1852)

DERIVATION: *bracteosa*, from the Latin *bractea*, bract, in reference to the persistent bracts associated with the flowers of this species

DESCRIPTION: *Shrub* 0.3–1.5 m tall. *Branchlets* soon glabrescent or glabrous (the lanuginulose-puberulous to lanuginulose hairs ephemeral). *Leaves* alternate or rarely ternate, 2.7–9 mm long, 0.9–1.5 mm wide, 2–8 times as long as wide, subsessile to short-petiolate; blade glabrescent (the lanuginulose to lanuginulose-puberulous hairs ephemeral), narrowly obovate, narrowly elliptic or narrowly oblong, in transverse section depressed obovate, strongly depressed obtriangular or semicircular, the base narrowly cuneate, the apex acute or obtuse, the veins longitudinal, 1–3, *oil glands* dense, distinct to obscure, more or less in rows. *Inflorescences* capitate or shortly spicate, pseudoterminal or lateral, sometimes below the leaves, with 4–20 monads, up to 16 mm wide. *Hypanthium* glabrous, 1.5–2.1 mm long. *Calyx lobes* abaxially glabrous, 0.8–1.1 mm long, scarious in a marginal band 0.1–0.15 mm wide. *Petals* deciduous, 1.6–2.2 mm long. *Stamens* 3–8 per bundle; filaments white, cream, or pale yellow, 4–6.3 mm long, the bundle claw 0.9–2.1 mm long, 0.3–0.4 times as long as the filaments. *Style* 5.6–6 mm long. *Ovules* 15–25 per locule. *Fruit* 2.4–3.2 mm long, with very small sepaline teeth; cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: from the Cunderdin district south to the Albany district and eastwards to the Ravensthorpe district.

ECOLOGY: Recorded as occurring in low mallee heath, open mallee woodland, dense heathland, tall scrubland, on sand, shallow clay loam, and laterite soil.

FLOWERING TIME: Recorded as flowering from August to November.

ESSENTIAL OILS: This species produced a sesquiterpenoid oil. The principal sesquiterpenes found in the oil were γ-eudesmol (12.1%), α-eudesmol (8.7%), β-eudesmol (11.2%), globulol (10.7%) and bicyclogermacrene (10.2%). There were lesser amounts of viridiflorene (4.0%), cubeban-11-ol (4.6%), allo-aromadendrene (1.6%) and spathulenol (1.7%). The principal monoterpene was α-pinene (2.9%). No other monoterpene was present at greater than 0.4%.

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

Melaleuca ***brevifolia*** Turcz.

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

DERIVATION: *brevifolia*, from the Latin *brevis*, short, and *folium*, leaf, in reference to the short leaves

DESCRIPTION: *Shrub or tree* 0.5–4 m tall. *Branchlets* soon glabrescent (the lanuginulose hairs ephemeral). *Leaves* alternate or rarely ternate, 2.4–8 mm long, 0.7–1.5 mm wide, 2.5–7 times as long as wide, subsessile or short-petiolate; blade soon glabrescent (the lanuginulose hairs ephemeral), narrowly obovate, narrowly elliptic, very narrowly obovate or very narrowly elliptic, in transverse section flattened transversely semielliptic, the base narrowly cuneate, the apex acute to obtuse, the veins longitudinal, 3, *oil glands* moderately dense, distinct to obscure, more or less in rows. *Inflorescences* capitate, lateral, with 1–6 monads, up to 18 mm wide. *Hypanthium* glabrous, 1.8–2 mm long. *Calyx lobes* abaxially hairy or glabrous, 0.6–0.9 mm long, herbaceous to the margin. *Petals* deciduous, 1.3–1.6 mm long. *Stamens* 10–12 per bundle; filaments white or cream, 5.2–6.3 mm long, the bundle claw 1–2 mm long, 0.09–0.3 times as long as the filaments. *Style* 6.8–9.2 mm long. *Ovules* 20–30 per locule. *Fruit* 3.3–4.2 mm long, the calyx lobes weathering away; cotyledons planoconvex.

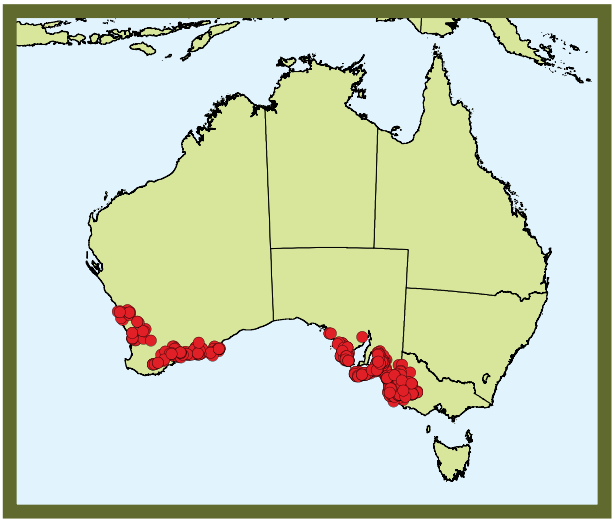
NATURAL OCCURRENCE: Western Australia, South Australia, Victoria: southern Western Australia, southern South Australia and western Victoria.

ECOLOGY: Recorded as occurring in sparse shrubland, open eucalypt woodland, disturbed heath, open heath, *Melaleuca* thicket, on gravelly light brown loam on edge of clay pan, sandy peaty creek lines, and white sand over schist and quartzite.

FLOWERING TIME: Recorded as flowering from January to December.

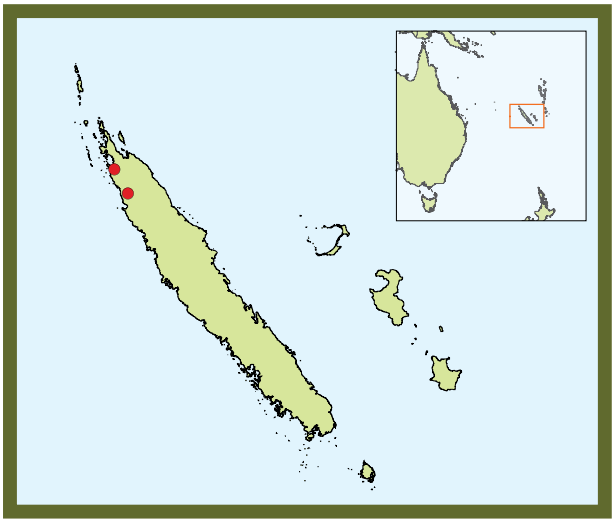
ESSENTIAL OILS: The leaf oil was predominantly monoterpenoid in nature. The principal components were α-pinene (12–28%), β-pinene (8–16%), limonene (5–14%) and 1,8-cineole (13–25%). There were lesser amounts of terpinen-4-ol (0.3–2.0%) and α-terpineol (1–4%). Sesquiterpenes, while plentiful in number, did not contribute much to the oil. The principal members were aromadendrene (1–4%), allo-aromadendrene (0.5–1.0%), viridiflorene (0.4–2.0%), bicyclogermacrene (0.6–3.0%), globulol (1–7%), viridiflorol (0.6–4.0%) and spathulenol (5–12%).

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



Melaleuca ***brevisepala*** (J.W.Dawson) Craven & J.W.Dawson

PUBLICATION: in Craven & Dawson, *Adansonia, sér. 3*, 20: 193 (1998)
DERIVATION: *brevisepala*, from the Latin *brevis*, short, and *sepalum*, sepal, in reference to the short calyx lobes
SYNONYM: *Callistemon brevisepalus* J.W.Dawson
DESCRIPTION: *Shrub* to 4 m tall. *Branchlets* glabrescent, pubescent. *Leaves* 12–23 mm long, 3–5 mm wide, short-petiolate; blade glabrescent, pubescent, elliptic to narrowly obovate, the base attenuate, the apex acute to rounded, the veins longitudinal, 3–5. *Inflorescences* pseudo-terminal and in distal leaf axils. *Hypanthium* 1.9–2 mm long. *Calyx lobes* abaxially hairy, 0.3–0.5(–1) mm long. *Petals* 2.2–2.6 mm long. *Stamens* 10–12 per flower, occasionally some may be fused; filaments yellow, 18–20 mm long. *Style* 22–25 mm long. *Fruit* 3 mm long.
NATURAL OCCURRENCE: New Caledonia: known only from a few localities in the north-west of Grande Terre.
ECOLOGY: Recorded as occurring in luxuriant maquis on lateritic colluvial, sometimes eroded, soil on ultramafic substrates.
FLOWERING TIME: Recorded as flowering in February, July and August.
ESSENTIAL OILS: This species gave a predominantly sesquiterpenoid leaf oil. The principal sesquiterpenes identified were β-caryophyllene (26.8%), caryophyllene oxide (7.8%), δ-cadinene (2.3%), globulol (5%), viridiflorol (3.1%), spathulenol (3.4%), α-cadinol (5.8%) and T-muurolol (3.2%). A significant number of oxygenated sesquiterpenes, totalling approximately 10% of the oil, were not identified. The principal monoterpenes were α-terpineol (2.2%), linalool (1.6%) and limonene (1.3%).
OIL YIELD: The oil yield (fresh weight, w/w) was 0.03%.
REFERENCE ON ESSENTIAL OILS: Hnawia et al. 2012.



Melaleuca ***bromelioides*** Barlow

PUBLICATION: *Australian Systematic Botany* 1: 112, fig. 8d–e (1988)

DERIVATION: *bromelioides*, from *Bromelia*, a genus of Bromeliaceae, and the Greek *-oides*, resembling, in reference to a perceived resemblance of the inflorescence bracts to the bromeliad growth form

DESCRIPTION: *Shrub* 0.3–3 m tall. *Branchlets* hairy to glabrescent, lanuginulose or lanuginulose-puberulous. *Leaves* alternate (subternate leaves occur sometimes but only in part), 7–13 mm long, 0.6–1.4 mm wide, 7–16 times as long as wide, short-petiolate to subsessile; blade hairy to glabrescent, lanuginose-pubescent to lanuginose, linear, linear-ovate or linear-elliptic, in transverse section sublunate, transversely elliptic, circular or transversely semielliptic, the base cuneate or attenuate, the apex acuminate to narrowly acute, the veins longitudinal, 1–3, *oil glands* sparse to moderately dense, distinct to obscure, scattered. *Inflorescences* capitate, pseudoterminal, with 2–10 monads, up to 20 mm wide. *Hypanthium* hairy, 2–2.4 mm long. *Calyx lobes* abaxially hairy, 1.2–1.4 mm long, herbaceous to the margin. *Petals* deciduous, 1.6–2.2 mm long. *Stamens* 10–14 per bundle; filaments white or cream, 5.7–7.8 mm long, the bundle claw 1–1.4 mm long, 0.2–0.3 times as long as the filaments. *Style* 8–8.4 mm long. *Ovules* 35–40 per locule. *Fruit* 4.25–5 mm long, with sepaline teeth; cotyledons flattened planoconvex.

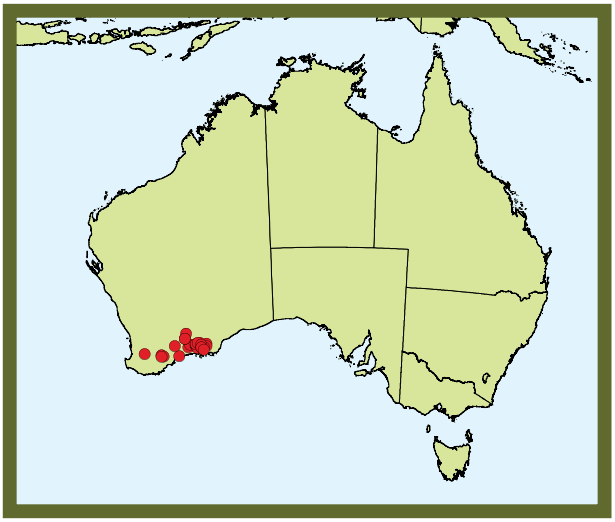
NATURAL OCCURRENCE: Western Australia: from the Lake King district eastwards to the Scaddan and Condingup districts.

ECOLOGY: Recorded as occurring in mallee, eucalypt woodland, open eucalypt forest, scrubland, on sandy loam, sandy soil with laterite, clay loam, quartz gravel, and sand.

FLOWERING TIME: Recorded as flowering in September and October.

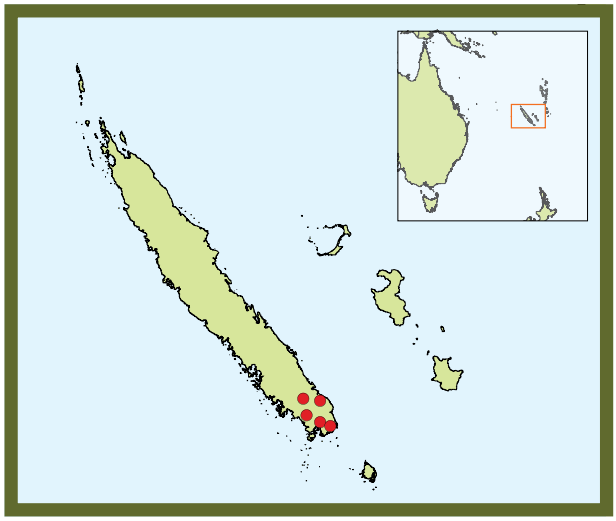
ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal component was 1,8-cineole (54.1%). This was accompanied by lesser amounts of α-pinene (7.7%), limonene (5.2%), β-pinene (1.1%), p-cymene (1.8%), terpinen-4-ol (3.7%) and α-terpineol (4.6%). The principal sesquiterpenes encountered were globulol (3.1%), spathulenol (4.4%) and allo-aromadendrene (0.9%).

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



Melaleuca ***brongniartii*** Daeniker

PUBLICATION: *Vierteljahrsschrifft der Naturforschenden Geschellschaft in Zürich* 78, Beibl. 19: 318 (1933)
DERIVATION: *brongniartii*, in honour of Adolphe Théodore de Brongniart (1801–1876), a French botanist who studied the flora of New Caledonia
DESCRIPTION: *Shrub* to 2 m tall. *Branchlets* glabrescent, pubescent. *Leaves* 20–40 mm long; blade glabrescent, the hairs appressed, narrowly elliptic to linear, the base attenuate, the apex acute, the veins longitudinal, 3–5. *Inflorescences* subspheroidal, pseudoterminal. *Hypanthium* 1.4–1.8 mm long. *Calyx lobes* c. 2 mm long. *Petals* 1.4–1.8 mm long. *Stamens* 5–6 per bundle; filaments white at anthesis but becoming reddish with age, 6–6.8 mm long. *Style* c. 7.6 mm long. *Fruit* 2 mm long.



NATURAL OCCURRENCE: New Caledonia: the southern part of Grande Terre.
ECOLOGY: Recorded as occurring in maquis along stream lines, areas susceptible to inundation, and on eroded or hard soils on ultramafic substrates.
FLOWERING TIME: Recorded as flowering from January to March.
ESSENTIAL OILS: The leaf oil of this species contained marginally more monoterpenes than sesquiterpenes. The principal monoterpenes encountered were α-pinene (23.3%), β-pinene (10.3%) and limonene (19.8%). These were accompanied by a lesser amount of α-terpineol (5.9%). Sesquiterpenes were numerous but present in smaller amounts. The principal sesquiterpenes detected were globulol (5%), viridiflorol (2.3%), spathulenol (3.1%), α-cadinol (3%), epicubenol (2.8%), δ-cadinene (1.4%) and aromadendrene (1.2%).
OIL YIELD: The oil yield (fresh weight, w/w) was 0.2%.
REFERENCE ON ESSENTIAL OILS: Hnawia et al. 2012

Melaleuca ***brophyi*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 864 (1999)

DERIVATION: *brophyi*, in honour of Joseph John Brophy (1943–), an expert on the essential oils of plants in the Australian region

DESCRIPTION: *Shrub* 0.3–3 m tall. *Branchlets* glabrescent, sericeous-pubescent to lanuginose-sericeous (often with some lanuginose-pubescent, sericeous-lanuginulose or lanuginulose hairs also), rarely sericeous. *Leaves* alternate, 4.5–16 mm long, 1–2 mm wide, 2.5–15 times as long as wide, subsessile; blade glabrescent, sericeous-pubescent to lanuginose-sericeous (with some lanuginose-pubescent to lanuginulose-puberulous or lanuginose to lanuginulose hairs also), linear, linear-obovate, very narrowly obovate, narrowly obovate or very narrowly elliptic to linear-elliptic, in transverse section transversely elliptic to transversely narrowly elliptic, flattened transversely semielliptic, semicircular to transversely semielliptic, depressed obovate or quadrate, the base parallel (blade width equals petiole width) or attenuate to narrowly cuneate, the apex acuminate or acute, the veins longitudinal, 3, *oil glands* dense, distinct, scattered. *Inflorescences* capitate, pseudoterminal and often also upper axillary, with 4–12 triads, up to 14 mm wide. *Hypanthium* hairy, 1–1.2 mm long. *Calyx lobes* abaxially glabrous or glabrescent, 0.1–0.5 mm long, scarious throughout. *Petals* caducous (rarely deciduous), 1–1.5 mm long. *Stamens* 3–6 per bundle; filaments very pale yellow-white or yellow to cream, 3.5–6 mm long, the bundle claw 0.7–3 mm long, 0.2–0.5 times as long as the filaments. *Style* 6–7 mm long. *Ovules* 15–20 per locule. *Infructescences* globose. *Fruit* 1.5–2.5 mm long, the calyx lobes weathering away; cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: the Wickepin – Lake King – Borden – Ravensthorpe district.

ECOLOGY: Recorded as occurring in open eucalypt woodland, low *Melaleuca* shrubland, silty *Melaleuca* swamp, along seasonal stream lines, on sand, sand over laterite, sand over clay, and saline clay.

FLOWERING TIME: Recorded as flowering from June to November.

ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal monoterpene was 1,8-cineole (71–74%). This was accompanied by lesser amounts of α-pinene (5–6%), limonene (3–5%), myrcene (1–2%), β-pinene (2–4%), terpinen-4-ol (1–4%) and α-terpineol (4–6%). The major sesquiterpenes in the oil were spathulenol (1–2%) and globulol (0.5–0.8%). No other sesquiterpene was present in amounts greater than 0.5%.

OIL YIELD: The oil yield (fresh weight, w/w) was 1.1–2.3%.

NOTES: This yellow-flowered member of the *M. scabra* group is worth trialling as an ornamental shrub in regions with a dry Mediterranean climate but care should be taken to obtain a form with good flower colour. At least some genotypes may be tolerant of saline soils.

Melaleuca ***buseana*** (Guillaumin) Craven & J.W.Dawson

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

DERIVATION: *buseana*, from the locality Pic Buse, New Caledonia

SYNONYM: *Callistemon buseanus* Guillaumin

DESCRIPTION: *Shrub or tree* to 7 m tall. *Branchlets* pubescent. *Leaves* 15–33 mm long, 4–6 mm wide, short-petiolate; blade glabrescent, pubescent, elliptic to narrowly obovate, the base attenuate, the apex rounded, the veins longitudinal, 3–5. *Inflorescences* spicate, pseudoterminal. *Hypanthium* hairy, 4–4.2 mm long. *Calyx lobes* fimbriate, 0.8–1.2 mm long. *Petals* 2–2.5 mm long. *Stamens* 3–4 per bundle; filaments yellow to greenish yellow, 10–25 mm long. *Style* 20–25 mm long. *Fruit* 4.5–6 mm long.

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

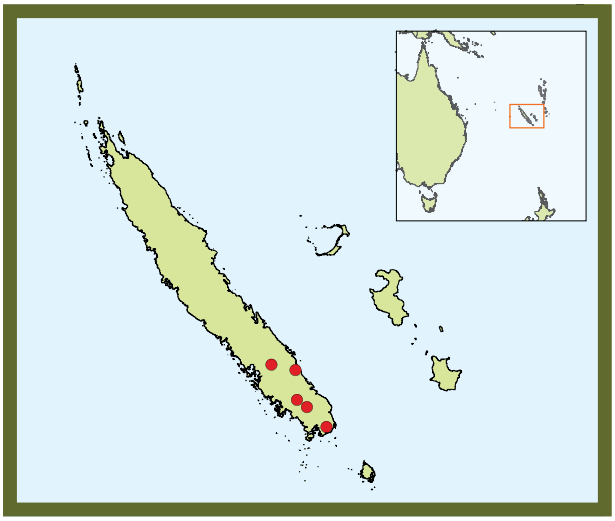
ECOLOGY: Recorded as occurring in the undergrowth of dense rainforest and in maquis on gravelly, colluvial soil that may be more or less eroded on ultramafic substrates.

FLOWERING TIME: Recorded as flowering in December, May and June.

ESSENTIAL OILS: The leaf oil of this species contained more monoterpenes than sesquiterpenes. The principal monoterpenes identified in the oil were γ-terpinene (15.2%), p-cymene (12.8%) and terpinolene (17.5%). These were accompanied by lesser amounts of α-pinene (2.3%), α-thujene (2.0%), limonene (7.3%), terpinen-4-ol (3.7%) and α-terpineol (2.6%). The principal sesquiterpenes identified were spathulenol (4.6%), globulol (4%), viridiflorol (2%) and β-caryophyllene (3%).

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

REFERENCE ON ESSENTIAL OILS: Hnawia et al. 2012



Melaleuca caeca Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 865 (1999)

DERIVATION: *caeca*, from the Latin *caecus*, blind, hence hidden, secret, in reference to the fact that relatively few collections have been made of this species within a generally well-botanised region

DESCRIPTION: *Shrub* 0.4–1 m tall. *Branchlets* glabrescent, sericeous. *Leaves* alternate, 8–21.5 mm long, 1–2.5 mm wide, 5–17 times as long as wide, sessile to subsessile; blade glabrescent, sericeous, very narrowly obovate or linear-obovate, in transverse section transversely linear, the base narrowly cuneate, truncate or parallel (blade width equals petiole width), the apex acuminate or obtuse to rounded, the veins longitudinal, 3, *oil glands* moderately dense, distinct to obscure, scattered. *Inflorescences* capitate or shortly spicate, pseudoterminal and sometimes also upper axillary, with 5–12 triads, up to 15 mm wide. *Hypanthium* hairy, 1.3–1.5 mm long. *Calyx lobes* abaxially hairy or rarely glabrous, 0.3–0.5 mm long, scarious in a marginal band 0.05–0.1 mm wide or herbaceous to the margin. *Petals* deciduous, 0.9–1.8 mm long. *Stamens* 4–7 per bundle; filaments purple, pinkish-mauve or mauve, 5–7.5 mm long, the bundle claw 0.8–2 mm long, 0.1–0.3 times as long as the filaments. *Style* 6.5–7.5 mm long. *Ovules* c. 15–20 per locule. *Infructescences* globose. *Fruit* 2–3.5 mm long, with weakly developed sepaline teeth; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Arrino – Gingin Brook district.

ECOLOGY: Recorded as occurring in heathland, open heathland, eucalypt woodland, on loam, and sand over laterite.

FLOWERING TIME: Recorded as flowering in September and October.

ESSENTIAL OILS: This species presented an overwhelmingly monoterpenoid leaf oil. The principal components of the oil were 1,8-cineole (51.1%) and α-pinene (27%). These were accompanied by lesser amounts of limonene (3.4%), α-terpineol (2.6%), β-pinene (1.5%), myrcene (1.9%) and β-phellandrene (1.9%). Sesquiterpenes were, of necessity, not plentiful. The major members were globulol (1.0%), bicyclogermacrene (0.7%), viridiflorol (0.5%) and spathulenol (0.4%).

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

Melaleuca ***cajuputi*** Powell

TAXONOMY: Three subspecies are recognised in this species: subsp. *cajuputi*, subsp. *cumingiana* (Turcz.) Barlow and subsp. *platyphylla* Barlow

PUBLICATION: *The Pharmacopoeia of the Royal College of Physicians of London (Transl.) 1809* 22 (1809), subsp. *cajuputi*; *Novon* 7: 113 (1997), subsp. *cumingiana*; *Novon* 7: 113, fig. 1A–D (1997), subsp. *platyphylla*

DERIVATION: *cajuputi*, from cajuput, an English name of the oil distilled from the foliage of this species, itself probably a corruption of the Indonesian name for the plant, *kayu putih*; *cumingiana*, in honour of Hugh Cuming (1791–1865), an English traveller and naturalist who made major botanical, zoological and conchological collections in the Malesian region; *platyphylla*, from the Greek *platys,* broad, wide, flat, level, *phyllon,* leaf

DESCRIPTION: *Tree or shrub* 2–35(–46) m tall; bark papery, grey, brownish, pink-tan or whitish. *Branchlets* glabrescent, sericeous-pubescent hairs on young growth, weathering to pubescent to puberulous hairs on older growth. *Leaves* alternate, 40–140 mm long, 7.5–60 mm wide, 1.3–9.7 times as long as wide, long- or short-petiolate; blade glabrescent, sericeous, narrowly elliptic, very narrowly elliptic, elliptic or oblong, in transverse section transversely linear, the base attenuate, the apex narrowly acute, acute, obtuse or rarely acuminate, the veins longitudinal, 5–9, *oil glands* moderately dense, obscure, scattered. *Inflorescences* spicate, pseudoterminal and often also upper axillary, rarely interstitial, with 8–20 triads, up to 28 mm wide. *Hypanthium* hairy or glabrous, 1.5–1.8 mm long. *Calyx lobes* abaxially hairy or glabrous, 0.9–1.5 mm long, scarious in a marginal band 0.15–0.5 mm wide. *Petals* deciduous, 1.7–2.5 mm long. *Stamens* (6–)8–12(–15) per bundle; filaments white, cream or greenish-yellow, 9–10.5 mm long, the bundle claw 1–3.5 mm long, 0.1–0.4 times as long as the filaments. *Style* 7.8–11.2 mm long. *Ovules* 35–55 per locule. *Fruit* 2–2.8 mm long, the calyx lobes deciduous; cotyledons obvolute or subobvolute (almost planoconvex).

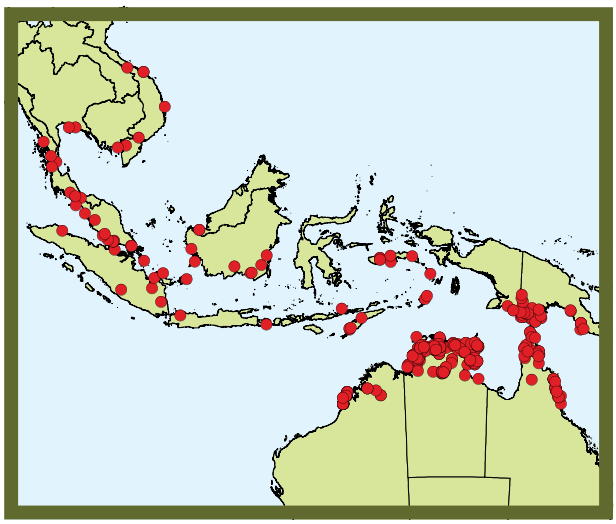
NATURAL OCCURRENCE: **subsp. *cajuputi*:** Western Australia, Northern Territory; also Indonesia, East Timor: the Dampier Peninsula – Calder River – Fitzroy Crossing district in Western Australia and the northern portion of the Northern Territory. **subsp. *cumingiana*:** Myanmar, Thailand, Vietnam, Malaysia, Indonesia (Sumatra, western

Java, south-western Kalimantan). **subsp. *platyphylla*:** Queensland; also Indonesia, Papua New Guinea: from the Torres Strait islands south to the Cairns district in Queensland; southern Papua province, Indonesia, and southern Papua New Guinea.

ECOLOGY: **subsp. *cajuputi*:** Recorded as occurring in woodland, vine forest, gallery forest, savannah forest, on cracking black clay, black peaty sand, and clay loam. **subsp. *cumingiana*:** Recorded as occurring in coastal swamp forest. **subsp. *platyphylla*:** Recorded as occurring in swamp forest, mixed open forest, swamp woodland, tall savannah, sedgeland, on sandy soil, and clay pans.

FLOWERING TIME: **subsp. *cajuputi*:** Recorded as flowering from March to November. **subsp. *cumingiana*:** Recorded as flowering from February to December. **subsp. *platyphylla*:** Recorded as flowering from January to May, August to September.

ESSENTIAL OILS: **subsp. *cajuputi*:** This subspecies appears to exist as one chemotype, with major amounts of 1,8-cineole, although several samples of a type containing E-nerolidol have also been identified. The oil of this subspecies contained 1,8-cineole (15–60%), limonene (1–5%), viridiflorene (0.5–7%), α-terpineol (1–7%), globulol (0.2–8.0%), viridiflorol (0.2–10.0%), spathulenol (0.4–30.0%) and β-caryophyllene (1–4%). The nerolidol samples contained E-nerolidol (93–95%) as the major component. **subsp. *cumingiana*:** Although *M. cajuputi* subsp. *cajuputi* is the basis of the cajuput oil industry in Indonesia and South East Asia, it is notable that samples of subsp. *cumingiana* from this region contained very little 1,8-cineole. A sample from Vietnam contained γ-terpinene (19%), terpinolene (20%), β-caryophyllene (19%), α-humulene (9%), α-pinene (3%) and β-pinene (3%) as major components. **subsp. *platyphylla*:** The leaf oil of this subspecies of *M. cajuputi* was found to exist in two chemotypes, one of which was completely terpenoid in character while the other one contained significant amounts of a β-triketone and aromatic compounds. Chemotype I contained platyphyllol (1-acetyl-4-methoxy-3,3,5-trimethylcyclohex-2,5-dione) (22–80%), together with cajeputol (1-acetyl-6-hydroxy-2,4-dimethoxy-3,5-dimethylbenzene) (3–57%) as principal components. These were accompanied by small amounts of other terpenes, mainly sesquiterpenes. This chemotype came from the Bensbach River area in Papua New Guinea (PNG). Chemotype II, which came from other areas in PNG and northern Cape York, Queensland, contained significant amounts of α-pinene (12–70%) and lesser amounts of 1,8-cineole (0.1–10.0%), γ-terpinene (1–10%), p-cymene (0.1–7.0%), β-caryophyllene (4–11%), α-humulene (3–8%) and caryophyllene oxide (2–10%).



OIL YIELD: **subsp. *cajuputi*:** The oil yield (fresh weight, w/w) was 0.4–1.2%. **subsp. *cumingiana*:** The oil yield (fresh weight, w/w) was 0.3–0.5%. **subsp. *platyphylla*:** The oil yield (fresh weight, w/w) for chemotype I was 0.2–0.6% and for chemotype II was 0.1–1.2%.

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

NOTES: The three subspecies are distinguished as follows: **subsp. *cajuputi*:** Leaves 2.8–9.7 times as long as wide, 7.5–26 mm wide; stamens 7–10 per bundle, the bundle claw 1–1.6 mm long. **subsp. cumingiana:** Leaves 2.2–2.9 times as long as wide; stamens 7–9 per bundle, the bundle claw 2.1–3 mm long. **subsp. *platyphylla*:** Leaves 1.3–6.5 times as long as wide, 15–50 mm wide; stamens 8–13 per bundle, the bundle claw 1.1–3.5 mm long.

Although *M. cajuputi* subsp. *cajuputi* is used locally in Australia by Aborigines as a medicinal plant, it has not entered into commerce in Australia. In Indonesia, on the other hand, selected forms of *M. cajuputi* subsp. *cajuputi* are the source of cajuput oil, widely used as a liniment and inhalant. Natural stands are managed to optimise oil production, and plantations have been established. Within the geographical range of subsp. *cumingiana*, subsp. *cajuputi* has been widely cultivated in plantations and this may cause some difficulty with the identification of specimens. It is possible that some morphologically intermediate plants may be of hybrid origin. The oil from subsp. *cajuputi* is sold as cajuput oil in Asian countries. Chemotype I of subsp. *platyphylla* may have insecticidal properties because of the presence of the known insecticide platyphyllol.

The species is useful as an ornamental tree for urban use in the tropics. The bark has been used for caulking boats in Indonesia.

Melaleuca calcicola (Barlow ex Craven) Craven & Lepschi

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

DERIVATION: *calcicola*, from the pharmaceutical Latin *calcium*, calcium, hence lime, and the Latin *-cola*, dweller, in reference to the occurrence of this taxon on limestone

SYNONYM: *Melaleuca apodocephala* subsp. *calcicola* Barlow ex Craven

DESCRIPTION: ***Shrub*** 0.2–4 m tall. ***Branchlets*** soon glabrescent (the lanuginulose hairs ephemeral). ***Leaves*** alternate, 4–11.5 mm long, 0.7–1.7 mm wide, 5–12 times as long as wide, subsessile to short-petiolate; blade soon glabrescent (the lanuginulose-puberulous to lanuginulose hairs ephemeral), linear, linear-obovate, linear-ovate, very narrowly obovate or very narrowly ovate, in transverse section transversely narrowly elliptic, transversely elliptic, subcircular or flattened transversely semielliptic, the base broadly attenuate or narrowly cuneate, the apex obtusely shortly acuminate, acuminate, narrowly acute, acute or rounded, the veins longitudinal, 3, ***oil glands*** sparse, obscure, more or less in rows. ***Inflorescences*** capitate, lateral or pseudoterminal and then approaching interstitial, with 1–15 monads, up to 12 mm wide. ***Hypanthium*** glabrescent, 1–2 mm long. ***Calyx lobes*** abaxially glabrescent or glabrous, 0.6–1.2 mm long, herbaceous to (or almost to) the margin. ***Petals*** deciduous, 1.2–2.3 mm long. ***Stamens*** 12–23 per bundle; filaments white or creamy-white, 1.5–5.5 mm long, the bundle claw 1–1.5 mm long, 0.1–0.4 times as long as the filaments. ***Style*** 4–6 mm long. ***Ovules*** 15–40 per locule. ***Fruit*** 3–5.5 mm long, with sepaline teeth; cotyledons subobvolute.

NATURAL OCCURRENCE: Western Australia: from the Scaddan district eastwards to the western edge of the Nullarbor Plain.

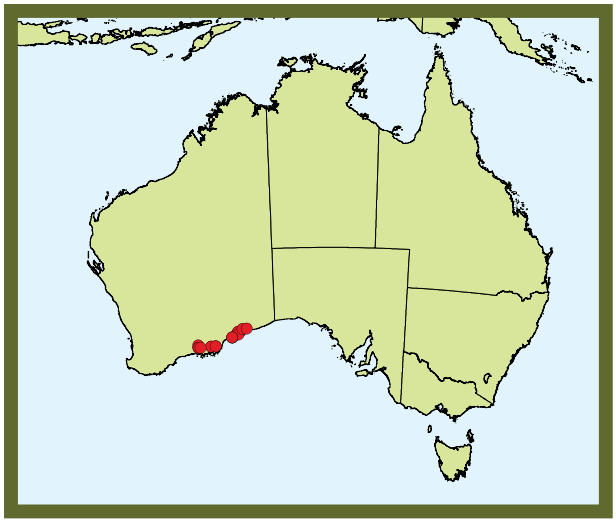
ECOLOGY: Recorded as occurring in mallee with *Melaleuca* understorey, low eucalypt forest, on limestone cliffs, loam, and rocky clay.

FLOWERING TIME: Recorded as flowering in November.

ESSENTIAL OILS: This species produced a monoterpenoid oil, with sesquiterpenes contributing little to the overall oil. The principal monoterpene was terpinen-4-ol (33%). This was accompanied by lesser amounts of α-terpinene (5.2%), γ-terpinene (8.8%), p-cymene (9.8%), α-terpineol (3.5%), α-pinene and α-thujene (both 2.6%). The principal sesquiterpene encountered was spathulenol (7.1%) and this was accompanied by globulol (1.9%), viridiflorol (0.6%), bicyclogermacrene and cubeban-11-ol (both 0.4%). Methyl eugenol (0.1%) was also detected.

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

NOTE: The terpinen-4-ol content of the oil is reasonably high but unless the yield can be significantly increased the species is not likely to be of economic interest.



Melaleuca ***calothamnoides*** F.Muell.

PUBLICATION: *Fragmenta phytographiae Australiae* 3: 114 (1862)

DERIVATION: *calothamnoides*, from *Calothamnus*, a genus of Myrtaceae, and the Greek *-oides*, resembling, in reference to a perceived similarity between this species and a species of *Calothamnus*

DESCRIPTION: *Shrub* 0.8–3 m tall. *Branchlets* glabrescent, lanuginose-sericeous. **Leaves** alternate, 7.5–13.5 mm long, 0.5–0.9 mm wide, 10–20 times as long as wide, short-petiolate to subsessile; blade glabrescent, lanuginose-sericeous, linear, narrowly oblong or linear-obovate, in transverse section transversely semielliptic, subcircular or depressed obovate, the base attenuate, the apex acute to rounded, 1-veined, *oil glands* dense to sparse, distinct to obscure, scattered. *Inflorescences* spicate, lateral on secondary shoots and then interstitial or pseudoterminal, with 40–60 monads, up to 40 mm wide. *Hypanthium* hairy, 1.9–2.3 mm long. *Calyx lobes* abaxially hairy, 1.2–1.6 mm long, herbaceous to the margin. *Petals* deciduous, 1.9–2.2 mm long. *Stamens* 4–5 per bundle; filaments greenish and tipped with orange or yellow/orange, becoming red at maturity, 15–17 mm long, the bundle claw 2.4–3.5 mm long, 0.2 times as long as the filaments. *Style* c. 17 mm long. *Ovules* 50–85 per locule. *Fruit* 4–5 mm long, the calyx lobes weathering away or replaced by sepaline teeth (the lobes then often obsolete and persisting on the sepaline teeth); cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: the lower Murchison River district.

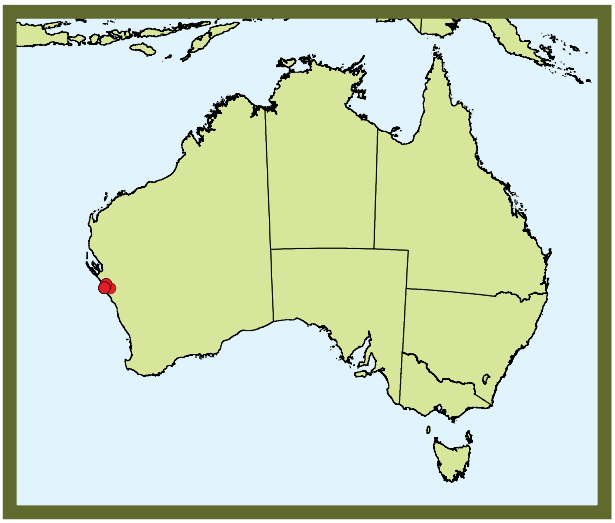
ECOLOGY: Recorded as occurring in heathland, dense shrubland, on sand, sand over sandstone, and creek beds.

FLOWERING TIME: Recorded as flowering from July to October.

ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal component was 1,8-cineole (74.2%). This was accompanied by lesser amounts of α-pinene (1.0%), limonene (3.1%), terpinen-4-ol (1.0%) and α-terpineol (7.8%). Sesquiterpenes contributed very little to the oil, with the principal members being globulol (0.9%), viridiflorol (0.8%), epiglobulol (0.8%) and an unknown sesquiterpene hydrocarbon (1.2%).

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

NOTES: Although the species naturally occurs in a region characterised by having a dry Mediterranean climate, it has proved adaptable in other climates and has been reported as being successful in subtropical regions (Elliot and Jones 1993; Wrigley and Fagg 1993).



Melaleuca ***calycina*** R.Br.

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

DERIVATION: *calycina*, from the Greek *kalyx*, calyx

DESCRIPTION: *Tree or shrub* 0.6–3 m tall; bark corky. *Branchlets* glabrescent, pubescent. *Leaves* decussate, 5–12 mm long, 2.9–6.8 mm wide, 1.2–2.5 times as long as wide, short-petiolate or subsessile; blade glabrescent, pubescent, ovate, broadly ovate or narrowly ovate, in transverse section lunate or sublunate, the base rounded, truncate, cuneate or subcordate, the apex acuminate or acute, the veins longitudinal, 5–7, *oil glands* dense, obscure to distinct, scattered. *Inflorescences* subcapitate, pseudoterminal, with 1–2 monads, up to 20 mm wide. *Hypanthium* hairy, 2.5–3 mm long. *Calyx lobes* abaxially hairy or glabrescent, 3.2–4 mm long, herbaceous to the margin. *Petals* deciduous, 4.4–4.6 mm long. *Stamens* 22–25 per bundle; filaments white or cream, 7.4–8.4 mm long, the bundle claw c. 2.5 mm long, 0.3 times as long as the filaments. *Style* 9.5–10.5 mm long. *Ovules* 80–105 per locule. *Fruit* 5–5.9 mm long, with sepaline teeth; cotyledons planoconvex.

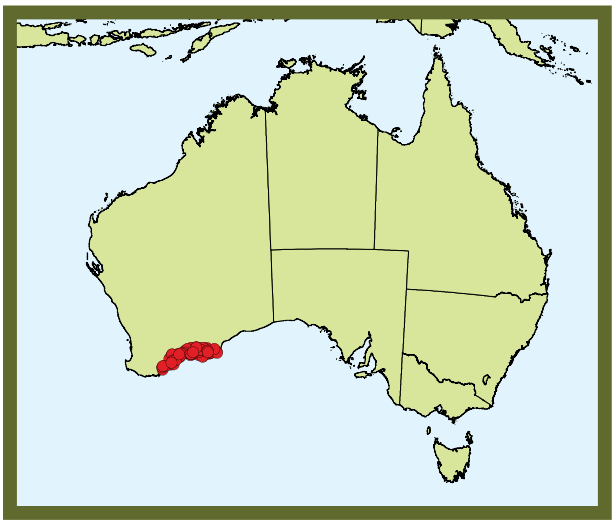
NATURAL OCCURRENCE: Western Australia: from the Stirling Range eastwards to the Cape Arid district.

ECOLOGY: Recorded as occurring in heathland, low mallee, open shrubland, on lateritic clay, grey loam, weathered granite, and sand plain.

FLOWERING TIME: Recorded as flowering from July to October.

ESSENTIAL OILS: The leaf oil obtained from this species contained a mixture mainly of monoterpenes and acyl-phloroglucinol derivatives. The principal monoterpenes identified in the oil were α-pinene (19.7%), 1,8-cineole (7.8%), terpinen-4-ol (3.1%) and α-terpineol (2.2%). Sesquiterpenes were not prominent in the oil, with the principal contributors being globulol (3.3%), viridiflorol (1.3%) and spathulenol (3.9%), no other sesquiterpene being more than 0.5%. Three aromatic compounds were detected in the oil, suspected of being 2,4-dimethoxy-6-hydroxyisobutyrophenone (31.1%), 2,4,6-trimethoxyisobutryophenone (1.3%) and 2,4-dimethoxy-(3 or 5)-methyl-6-hydroxyisobutyrophenone (4.4%).

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



Melaleuca ***calyptroides*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 866 (1999)

DERIVATION: *calyptroides*, from the Greek *kalypto*, cover, conceal, hence calyptra, and *-oides*, resembling, in reference to the cap formed by the coherent and caducous petals

DESCRIPTION: *Shrub* 0.3–1.5 m tall. *Branchlets* hairy to glabrescent, sericeous to minutely sericeous and sericeous-pubescent (often with some sericeous-lanuginulose to lanuginulose-puberulous and lanuginulose hairs also). *Leaves* alternate, 5.5–28 mm long, 0.7–1.7 mm wide, 5–30 times as long as wide, sessile to subsessile; blade hairy to glabrescent, the hairs as on the branchlets, linear, linear-obovate or very narrowly obovate, in transverse section transversely elliptic to subcircular or depressed obovate, the base truncate, parallel (blade width equals petiole width) to narrowly cuneate, the apex acuminate, acute or obtuse to rounded, the veins longitudinal, 3, *oil glands* moderately dense or dense, distinct to obscure, scattered. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 1–2 triads or up to 9 monads, up to 30 mm wide. *Hypanthium* hairy, 2.5–4 mm long. *Calyx lobes* abaxially hairy or rarely glabrescent, 0.6–1.8 mm long, herbaceous to the margin or scarious in a marginal band 0.2–0.4 mm wide. *Petals* caducous, 2–5.5 mm long. *Stamens* (6–)8–15 per bundle; filaments pink, mauve, purple or magenta, 7.5–16.5 mm long, the bundle claw 1.8–7 mm long, 0.2–0.5 times as long as the filaments. *Style* 9–15.5 mm long. *Ovules* 15–30 per locule. *Infructescences* peg-fruited. *Fruit* 3.5–6 mm long, the calyx lobes weathering away or replaced by weakly developed sepaline teeth; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: from the Watheroo–Morawa district south to the Merredin–Hyden–Coolgardie district.

ECOLOGY: Recorded as occurring in heath, tall shrubland, mallee shrubland, open scrub, on sand plain, clayey sand, sand over laterite, loamy sand, and lateritic loam.

FLOWERING TIME: Recorded as flowering from July to November.

ESSENTIAL OILS: The oil from this species contained significant amounts of both mono- and sesquiterpenes. The principal monoterpenes were 1,8-cineole (13–50%), α-pinene (6–11%), linalool (1–12%) and α-terpineol (3–5%). The main sesquiterpenes identified were globulol (3–13%), viridiflorol (4–13%), spathulenol (4–8%), β-eudesmol (1–6%) and cubeban-11-ol (1–6%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.2–0.7%.

NOTES: This member of the *M. scabra* group warrants trial as a small ornamental shrub for regions with a dry Mediterranean climate as its flowers are very brightly coloured.

Melaleuca campanae Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 866 (1999)

DERIVATION: *campanae*, in honour of Barbara and Donald (Don) Bellairs, of Kalbarri, Western Australia—*campanae* is a noun in apposition derived from the Latin *campana*, bell, as the family name Bellairs is considered by some to pertain to bell-house

DESCRIPTION: *Shrub* 0.3–1.5 m tall. *Branchlets* glabrescent, sericeous. *Leaves* alternate, 12–57 mm long, 4–9.5 mm wide, 2.5–8 times as long as wide, short-petiolate; blade at length glabrescent, sericeous, narrowly obovate, very narrowly obovate, linear-elliptic, narrowly elliptic or elliptic, in transverse section transversely linear, the base attenuate, the apex acuminate, obtusely shortly acuminate or obtuse to rounded, the veins longitudinal, 5 or rarely 7, *oil glands* moderately dense to dense, obscure to distinct, scattered. *Inflorescences* capitate or shortly spicate, pseudoterminal and sometimes also upper axillary, with 5–12 triads, up to 27 mm wide. *Hypanthium* hairy, 1.5–2 mm long. *Calyx lobes* abaxially hairy, 0.5–1 mm long, scarious in a marginal band 0.2–0.4 mm wide or scarious throughout. *Petals* caducous, 1.8–2.3 mm long. *Stamens* 7–11 per bundle; filaments pink or mauve (rapidly fading to white), 8.5–13.5 mm long, the bundle claw 1.9–5.7 mm long, 0.2–0.5 times as long as the filaments. *Style* 10.5–15 mm long. *Ovules* 5–15 per locule. *Infructescences* globose. *Fruit* 2.5–3 mm long, the calyx lobes weathering away or replaced by weakly developed sepaline teeth; cotyledons obvolute.

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

ECOLOGY: Recorded as occurring in dense low shrubland, coastal sand plain, on lateritic soil, limestone, and exposed sandstone bluffs.

FLOWERING TIME: Recorded as flowering from August to January.

ESSENTIAL OILS: The leaf oil of this species was monoterpenoid in nature. The principal monoterpene was 1,8-cineole (34.3%) and this was accompanied by lesser amounts of α-pinene (4.2%), β-pinene (8.2%), limonene (1.4%), linalool (2.8%) and α-terpineol (4.7%). The principal sesquiterpenes encountered in the oil were globulol (6.0%), spathulenol (9.1%), viridiflorol (3.2%) and bicyclogermacrene (3.1%).

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

Melaleuca ***camptoclada*** F.C.Quinn

PUBLICATION: in Cowley, Quinn, Barlow & Craven, *Australian Systematic Botany* 3: 199, fig. 14c (1990)

DERIVATION: *camptoclada*, from the Greek *kampto*, bend, curve, and *klados*, branch, stem, in reference to the habit of this species

DESCRIPTION: *Shrub* 1.5–3 m tall. *Branchlets* glabrous to glabrescent, sparsely puberulous when hairy. *Leaves* alternate (sometimes in part subternate), 2.9–5.5 mm long, 1.5–1.8 mm wide, 2–4 times as long as wide, subsessile; blade glabrous to glabrescent, sparsely puberulous when hairy, narrowly elliptic, elliptic or narrowly suboblong-elliptic, in transverse section lunate or transversely linear, the base cuneate to rounded, the apex acute to rounded, the veins longitudinal, 3, *oil glands* moderately dense, distinct, scattered. *Inflorescences* spicate or capitate, lateral on secondary shoots and then pseudoterminal or interstitial, with 5–15 monads, up to 16 mm wide. *Hypanthium* glabrous, 1–1.5 mm long. *Calyx lobes* abaxially glabrous, 0.5–0.8 mm long, scarious in a marginal band c. 0.1 mm wide. *Petals* deciduous, 1.5–2.4 mm long. *Stamens* 9–16 per bundle; filaments mauve, 5.1–6.5 mm long, the bundle claw 2.2–3.5 mm long, 0.5–0.6 times as long as the filaments. *Style* c. 8 mm long. *Ovules* 30–40 per locule. *Fruit* 2.5–3.5 mm long, with sepaline teeth; cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: from the Stirling Range south to the Mount Barker district.

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

FLOWERING TIME: Recorded as flowering from September to November.

ESSENTIAL OILS: This species gave a strongly monoterpenoid leaf oil. The principal components were 1,8-cineole (59.6%) and α-pinene (23.5%). Also present were lesser amounts of β-pinene (2.1%), myrcene (1.8%) and limonene (6.7%). The major sesquiterpenes encountered were globulol (0.9%), viridiflorol (0.4%) and spathulenol (0.3%), though sesquiterpenes, in total, accounted for less than 5% of the oil.

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

Melaleuca ***capitata*** Cheel

PUBLICATION: *Journal and Proceedings of the Royal Society of New South Wales* 58: 194 (1924)

DERIVATION: *capitata*, from the Latin, *caput*, head, in reference to the shape of the inflorescence

DESCRIPTION: *Shrub* 0.8–2.5 m tall. *Branchlets* glabrescent, sericeous to pubescent. *Leaves* alternate, 10–25 mm long, 1–3 mm wide, 6–20 times as long as wide, shortpetiolate; blade glabrescent, sericeous to pubescent, very narrowly elliptic to linear-elliptic, in transverse section transversely linear, the base narrowly cuneate, the apex narrowly acute to acute, the veins longitudinal, 3, *oil glands* moderately dense, obscure, scattered or in rows. *Inflorescences* capitate or shortly spicate, pseudoterminal, with 3–15 monads, up to 35 mm wide. *Hypanthium* hairy, 4–5 mm long. *Calyx lobes* abaxially hairy, 1.4–2.3 mm long, herbaceous to the margin. *Petals* deciduous, 3–3.5 mm long. *Stamens* 14–33 per bundle; filaments cream or rarely yellow, 6–10 mm long, the bundle claw 1.2–2(–3) mm long, 0.2–0.3 times as long as the filaments. *Style* 10–14.5 mm long. *Ovules* 90–120 per locule. *Fruit* 5–7 mm long, the calyx lobes deciduous (sometimes the extreme basal portion of the lobes may become woody and persist as a more or less prominent ring around the aperture); cotyledons obvolute.

NATURAL OCCURRENCE: New South Wales: from the Bundanoon district south to the Braidwood district.

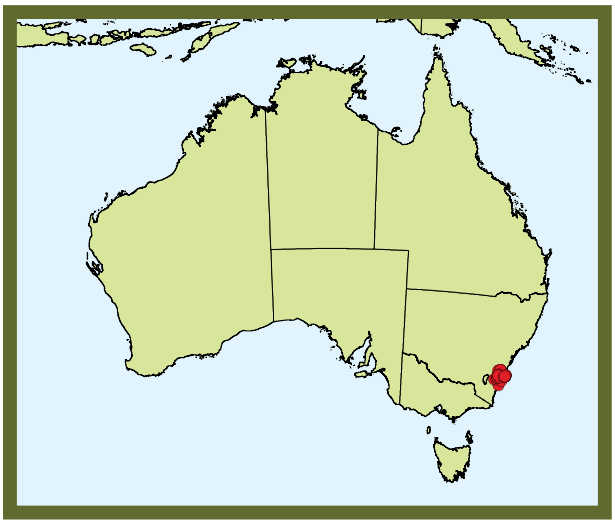
ECOLOGY: Recorded as occurring in low eucalypt woodland, heathland, open eucalypt forest, on sandy loam, sand, and skeletal soil on sandstone.

FLOWERING TIME: Recorded as flowering from October to December.

ESSENTIAL OILS: The leaf oil of this species was dominated by α-pinene (77–83%). There were lesser amounts of the monoterpenes limonene (1–2%), linalool (0.4–2.0%), α-terpineol (2–4%), geranyl acetate (0.6–2.0%) and geraniol (0.5–2.0%). Sesquiterpenes did not contribute much to the oil. The principal members were globulol (0.5–1.0%), spathulenol (1–2%) and α-, β- and γ-eudesmol (each 0.1–0.4%).

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

NOTES: This species has potential as an ornamental shrub in temperate climates in Australia.



Melaleuca ***cardiophylla*** F.Muell.

PUBLICATION: *Fragmenta phytographiae Australiae* 1: 225 (1859)

DERIVATION: *cardiophylla*, from the Greek *cardio-*, heart, and *-phyllus*, leaved, in reference to the shape of the leaf blade

DESCRIPTION: *Shrub* 0.2–3.5 m tall. *Branchlets* hairy or glabrous (when present, the hairs puberulous, velutinulous or lanuginulose, sometimes also with much longer lanuginose to pubescent hairs). *Leaves* alternate, peltate (sometimes indistinctly so), 2–8.5 mm long, 1.75–6.5 mm wide, 1.1–1.8 times as long as wide, sessile; blade hairy to glabrescent, velutinulous to lanuginulose and sometimes also with pubescent to lanuginose hairs on the proximal central region, ovate, broadly ovate, subcircular or broadly elliptic, in transverse section transversely linear or strongly sublunate, the base cuneate to truncate, the apex acuminate or acute, the veins longitudinal, c. 12–20, *oil glands* moderately dense, distinct to obscure, more or less in rows. *Inflorescences* capitate, lateral and rarely with a distal leafy axis, with 1–5 monads, up to 25 mm wide. *Hypanthium* glabrous or hairy, 2.7–3.5 mm long. *Calyx lobes* abaxially glabrous or hairy; costate, 1.5–2.2 mm long, scarious in a marginal band 0.3–0.4 mm wide. *Petals* deciduous, 3.5–4.4 mm long. *Stamens* c. 40–80 per bundle; filaments white or cream, 6.5–8.5 mm long, the bundle claw 5–6.5 mm long, 0.8–0.9 times as long as the filaments. *Style* 4.5–5.5 mm long. *Ovules* 40–65 per locule. *Fruit* 5–7 mm long, with sepaline teeth; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: from the Exmouth district south to the Perth district.

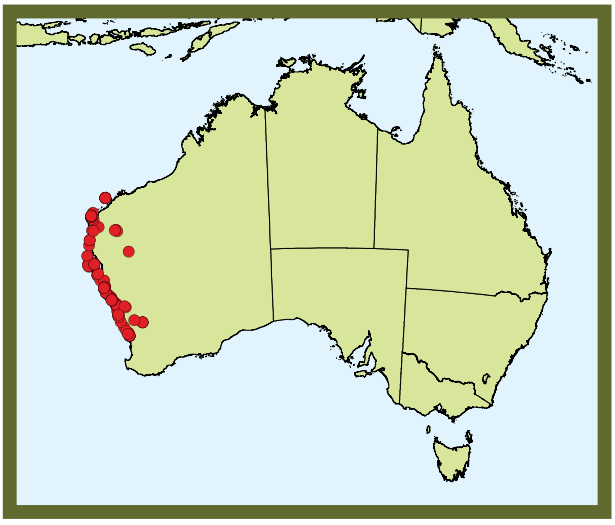
ECOLOGY: Recorded as occurring in coastal heath, mallee–spinifex community, scrubland, on limestone ridges, sand, clay depression in limestone soil, and salt pans.

FLOWERING TIME: Recorded as flowering from August to January.

ESSENTIAL OILS: The leaf oil of this species was composed of a mixture of mono- and sesquiterpenes, with monoterpenes predominating. The major monoterpenes were α-pinene (3–9%), β-pinene (10–17%), limonene (2–6%), p-cymene (2–3%), E-β-ocimene (1–4%), myrcene (1–3%), terpinen-4-ol (1–2%) and α-terpineol (1–2%). The principal sesquiterpenes were globulol (8–10%), viridiflorol (4–6%) and spathulenol (3–7%), with lesser amounts of aromadendrene (0.4–2%), allo-aromadendrene (1–2%), viridiflorene (2–4%), bicyclogermacrene (1–4%), δ-cadinene (1–2%), cubeban-11-ol (3–6%) and α-cadinol (1–3%).

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

REFERENCE ON ESSENTIAL OILS: Brophy and Doran 1996



Melaleuca carrii Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 867 (1999)

DERIVATION: *carrii*, in honour of Denis John Carr (1915–2008), a developmental biologist and taxonomist at the Australian National University, Canberra, who took a special interest in the anatomy and development of *Eucalyptus*, another genus of Myrtaceae

DESCRIPTION: ***Shrub*** 0.3–2 m tall; bark fissured, fibrous. ***Branchlets*** glabrescent or glabrous (when present, the hairs pubescent grading to lanuginose-pubescent to, occasionally, lanuginose as well). ***Leaves*** alternate, 6.5–27 mm long, (0.5–)0.6–1.1(–1.6) mm wide, 6–30 times as long as wide, sessile to subsessile; blade glabrescent or glabrous (when present, the hairs pubescent, occasionally approaching more or less sericeous-pubescent, and often grading to lanuginose-pubescent distally), linear, linear-obovate or very narrowly obovate, in transverse section subcircular to transversely elliptic, circular or depressed obovate, the base truncate or parallel (blade width equals petiole width), the apex acuminate or acute to obtuse, the veins longitudinal, 3, ***oil glands*** dense or moderately so, obscure to distinct, scattered. ***Inflorescences*** capitate, pseudoterminal and sometimes also upper axillary, with 5–12 triads, up to 18 mm wide. ***Hypanthium*** hairy or rarely glabrous (including the ovary), 1–1.5 mm long. ***Calyx lobes*** abaxially glabrescent or hairy, rarely glabrous, 0.2–0.5 mm long, herbaceous to the margin or scarious in a marginal band 0–0.2 mm wide. ***Petals*** deciduous, 0.7–1.5 mm long. ***Stamens*** 4–6 per bundle; filaments mauve to purple, pink or magenta, 4–7.5 mm long, the bundle claw 0.5–2.5 mm long, 0.1–0.4 times as long as the filaments. ***Style*** 5–7 mm long. ***Ovules*** c. 8–15 per locule. ***Infructescences*** globose. ***Fruit*** 2–3 mm long, the calyx lobes weathering away or replaced by weakly developed sepaline teeth; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: from the Eneabba – Three Springs district south to the Jerramungup–Esperance district.

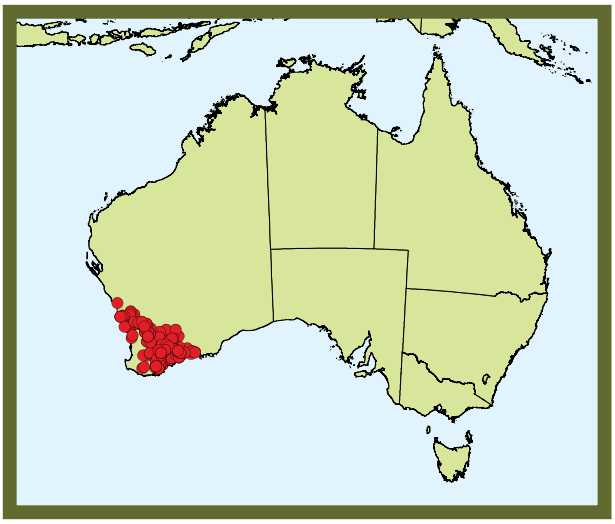
ECOLOGY: Recorded as occurring in heathland, open shrubland, low mallee woodland with heath understorey, swampy area on edge of open sedgeland, on sand over clay, lateritic loam, and loamy clay over granite.

FLOWERING TIME: Recorded as flowering from April to November.

ESSENTIAL OILS: The oil from this species was monoterpenoid in character, though within this type it was variable. The principal components of the oil, from collection BJL 1708, were 1,8-cineole (11–36%), myrtenol (2–32%) and α-pinene (14–68%), with lesser amounts of α-terpineol (1–3%) and β-pinene (1–4%). A second collection, BJL 1701, contained 1,8-cineole (59.6%), α-pinene (8.9%), β-pinene (5.7%), limonene (9.7%) and α-terpineol (3.2%) as main components. Sesquiterpenes, in both collections, did not contribute much to the oil, with globulol (1%) being the main component in both collections.

OIL YIELD: The oil yield in both collections (fresh weight, w/w) was 0.7–0.8%.

NOTES: This species is widespread in south-western Australia and was previously often confused with the typically coastal species, *M. pentagona*. *Melaleuca carrii* has deciduous petals and ungrooved leaves whereas *M. pentagona* has caducous petals and grooved leaves. Because of its wide geographical range, there is potential for selecting genotypes that would be successful for use as ornamental shrubs in areas with a Mediterranean climate.



Melaleuca ***cheelii*** C.T.White

PUBLICATION: *Proceedings of the Royal Society of Queensland* 43: 16, t. 2 (1931)

DERIVATION: *cheelii*, in honour of Edwin Cheel (1872–1951), a botanist at the state herbarium in Sydney, Australia

DESCRIPTION: *Tree or shrub* 2–10 m tall; bark papery. *Branchlets* glabrescent, lanuginulose-puberulous to lanuginulose or puberulous. *Leaves* decussate (occasionally sub-opposite), 5–12.5 mm long, 2–6 mm wide, 2–3 times as long as wide, subsessile to short-petiolate; blade glabrescent, lanuginulose to sericeous-lanuginulose and usually with some sericeous-pubescent to pubescent hairs also, elliptic, narrowly elliptic or broadly elliptic, in transverse section transversely linear, the base cuneate, the apex acuminate or acute, the veins longitudinal, 3–5, *oil glands* dense, distinct to obscure, scattered. *Inflorescences* spicate, pseudoterminal, with 2–10 monads (rarely in part are dyads present), up to 20 mm wide. *Hypanthium* hairy or glabrescent, 2–2.5 mm long. *Calyx lobes* abaxially glabrescent, 0.8–1.5 mm long, herbaceous to the margin or rarely scarious in a marginal band 0–0.2 mm wide. *Petals* deciduous, 2–2.7 mm long. *Stamens* 8–18 per bundle; filaments cream to white, 6.5–8.3 mm long, the bundle claw 1.8–2.3 mm long, 0.2–0.3 times as long as the filaments. *Style* 10–12 mm long. *Ovules* c. 65–150 per locule. *Fruit* 4–4.5 mm long, the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Queensland: the Bundaberg district.

ECOLOGY: Recorded as occurring in heathy *Melaleuca* swamp, and on sandy soil.

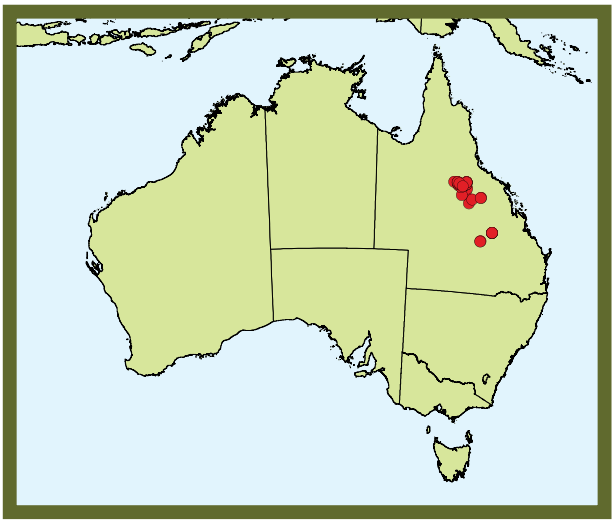
FLOWERING TIME: Recorded as flowering in September.

ESSENTIAL OILS: The leaf oil of this species was dominated by α-pinene (83%). There were lesser amounts of isovaleraldehyde (1.2%), limonene (1.4%) and α-terpineol (2.2%). Sesquiterpenes did not contribute much to the oil, with the principal members being aromadendrene (1.2%), bicyclogermacrene (1.1%), globulol (1.2%), viridiflorol (0.7%) and spathulenol (0.5%).

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

Melaleuca ***chisholmii*** (Cheel) Craven

PUBLICATION: *Novon* 16: 471 (2006)
DERIVATION: *chisholmii*, in honour of J.R. Chisholm who made plant collections in Queensland, Australia, including the type collection of this species
SYNONYM: *Callistemon chisholmi* Cheel
DESCRIPTION: ***Shrub*** 1.5–3 m tall; bark rough, dark grey. ***Branchlets*** glabrescent, lanuginose-sericeous overlaid with pubescent hairs. ***Leaves*** alternate, 25–100 mm long, 1–7 mm wide, 9–60 times as long as wide, subsessile or short-petiolate; blade glabrescent, sericeous to lanuginose-sericeous, narrowly elliptic, narrowly obovate, linear-elliptic or linear-obovate, in transverse section transversely linear to sublunate to broadly subreniform, the base very narrowly cuneate to parallel (blade width equals petiole width), the apex acute or very shortly acuminate, the veins pinnate or longitudinal, when pinnate with up to 30 veins, 3-veined when longitudinal-veined only, ***oil glands*** moderately dense, distinct or obscure, scattered. ***Inflorescences*** spicate, pseudoterminal or effectively so, with 10–30 monads, 40–50 mm wide. ***Hypanthium*** hairy or glabrous, 2.6–4.4 mm long. ***Calyx lobes*** abaxially hairy (sometimes on the margin only), 1.1–1.7 mm long, scarious in a marginal band 0.3–0.7 mm wide. ***Petals*** deciduous, 3.1–5.6 mm long. ***Stamens*** 25–57 per flower; filaments red, 15–24 mm long; anthers yellow. ***Style*** 20–27 mm long. ***Ovules*** c. 150–200 per locule. ***Fruit*** 3.7–6.1 mm long, the calyx lobes deciduous; cotyledons obvolute.
NATURAL OCCURRENCE: Queensland: upland country in north-central Queensland.
ECOLOGY: Recorded as occurring in woodland along creeks, on creek banks in open forest, open woodland, along watercourses, on sandy stony soil, granite pavement, and red sandy soil.
FLOWERING TIME: Recorded as flowering from June to March, mainly from September to February.
ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal components were α-pinene (4–35%, the majority >25%) and 1,8-cineole (48–80%). These were accompanied by lesser amounts of limonene (2–6%), linalool (1–4%) and α-terpineol (4–7%). Sesquiterpenes were virtually absent from this oil.
OIL YIELD: The oil yield (fresh weight, w/w) was 0.3–0.4%.
REFERENCE ON ESSENTIAL OILS: Brophy et al. 1998



Melaleuca ***ciliosa*** Turcz.

PUBLICATION: *Bulletin de la Société Impériale des Naturalistes de Moscou* 35: 326 (1862)

DERIVATION: *ciliosa*, from the Latin *cilium*, a fine hair, in reference to the ciliate leaf margin of this species

DESCRIPTION: *Shrub* 0.4–1 m tall. *Branchlets* glabrescent, pubescent with scattered and longer pubescent hairs overlying these. *Leaves* alternate, 4–12 mm long, 2.5–6.5 mm wide, 1.5–3 times as long as wide, subsessile; blade glabrescent, ciliate (usually a few scattered pubescent hairs are present also), obovate, elliptic to narrowly elliptic, narrowly obovate or broadly elliptic, in transverse section transversely linear or transversely semielliptic, the base cuneate, the apex obtusely shortly acuminate or acute to rounded, the veins longitudinal to longitudinal-pinnate, 3 longitudinal veins, *oil glands* moderately dense to dense, distinct, more or less in rows or scattered. *Inflorescences* capitate or spicate, pseudoterminal and sometimes also upper axillary, with 3–15 triads, up to 23 mm wide. *Hypanthium* hairy, 1–1.5 mm long. *Calyx lobes* abaxially glabrous, 0.5–1 mm long, scarious in a marginal band 0.1–0.4 mm wide. *Petals* caducous, 1.5–2 mm long. *Stamens* 5–11 per bundle; filaments pale yellow or white, 6.5–10 mm long, the bundle claw 2.4–4.7 mm long, 0.3–0.5 times as long as the filaments. *Style* 8–12.5 mm long. *Ovules* 8–20 per locule. *Infructescences* globose to 'peg-fruited'. *Fruit* 2–2.5 mm long, the calyx lobes weathering; cotyledons obvolute.

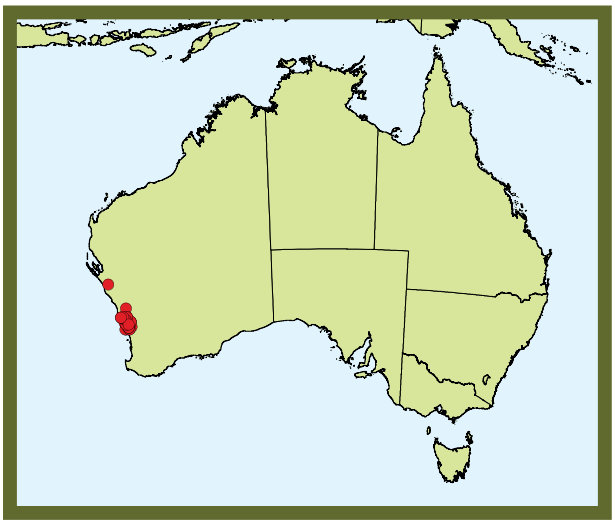
NATURAL OCCURRENCE: Western Australia: the lower Murchison River district and the Badgingarra–Watheroo–Mogumber district.

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

FLOWERING TIME: Recorded as flowering from September to January.

ESSENTIAL OILS: The leaf oil of the bulk sample of this species contained both mono- and sesquiterpenes and, from the components present, it is thought that there is the possibility of different chemotypes being present. The principal monoterpenes present in the oil were α-pinene (10.2%), linalool (16.5%), β-pinene (7.1%), limonene (3.9%), 1,8-cineole (8.9%), E-β-ocimene (4.9%) and α-terpineol (3.0%). The principal sesquiterpenes encountered were E-nerolidol (6.9%), bicyclogermacrene (1.3%), cubeban-11-ol (3.2%), globulol (6.2%), viridiflorol (2.9%), spathulenol (2.2%) and α-cadinol (1.9%).

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



Melaleuca citrina (Curtis) Dum.-Cours.

PUBLICATION: *Le Botaniste Cultivateur, ed. 1,* 3: 282 (1802)

DERIVATION: *citrina*, from *Citrus*, a genus of Rutaceae, hence the Latin adjective *citrinus*, in reference to the aromatic foliage that apparently reminded Curtis of *Citrus*

SYNONYMS: *Metrosideros citrina* Curtis; *Callistemon citrinus* (Curtis) Skeels; *Callistemon lanceolatus* (Smith) Sweet

DESCRIPTION: ***Shrub*** 1–5 m tall; bark fibrous or hard-papery. ***Branchlets*** glabrescent, velutinous or sericeous-pubescent overlaid with sparse velutinous hairs. ***Leaves*** alternate, 26–99 mm long, 4–25 mm wide, 3.5–16 times as long as wide, long- or short-petiolate; blade glabrescent, sericeous or lanuginose, narrowly elliptic, narrowly obovate, elliptic or very narrowly elliptic, in transverse section transversely linear, sublunate, obsublunate or broadly v-shaped, the base very narrowly attenuate, very narrowly cuneate or attenuate, the apex narrowly acute, acute or very shortly acuminate, the veins pinnate, 7–26, ***oil glands*** dense to sparse, distinct, scattered. ***Inflorescences*** spicate, pseudoterminal and sometimes also upper axillary, with (10–)20–80 monads, 45–70 mm wide. ***Hypanthium*** hairy, glabrescent or glabrous, 3.8–5.4 mm long. ***Calyx lobes*** abaxially hairy (sometimes on the margin only), 1.3–2.3 mm long, scarious in a marginal band 0.5–0.6 mm wide or herbaceous to the margin. ***Petals*** deciduous, 3.9–5.8 mm long. ***Stamens*** 30–45 per flower; filaments red or mauve, 17–25 mm long; anthers purple. ***Style*** 23–31 mm long. ***Ovules*** c. 170–300 per locule. ***Fruit*** 4.4–7 mm long, the calyx lobes deciduous; cotyledons obvolute.

NATURAL OCCURRENCE: New South Wales, Victoria: north-eastern New South Wales to eastern-coastal Victoria, often extending inland to the lower eastern slopes of the Great Dividing Range and also in the Blue Mountains of New South Wales.

ECOLOGY: Recorded as occurring in swampy areas, damp heathy slopes, fringing low open forest, closed heath, tall heath, swampy hillsides, cyperaceous swamps, open forest, wet heath, swamp forest, open flat in sclerophyll forest, tall eucalypt forest, at the base of volcanic cliffs, on sand, clay, sandy peaty soil, sandy loam, and sandstone.

FLOWERING TIME: Recorded as flowering in March and April, June and July, and from September to January.

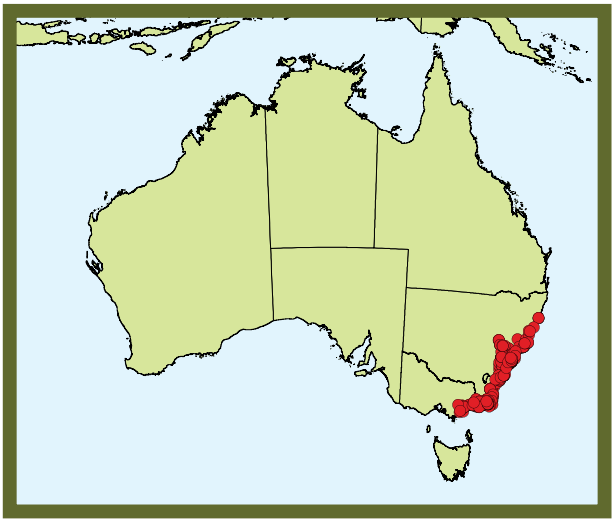
ESSENTIAL OILS: This species produced an oil that was dominated by 1,8-cineole (68–72%). Other monoterpenes present included limonene (8–10%), α-terpineol (7–9%), terpinene-4-ol (0.5–2.0%) and myrcene (1–3%). Sesquiterpenes, while numerous, accounted for less than 5% of the oil, with the main members being spathulenol (0.6–2.0%), E,E-farnesol (0.3%), δ-cadinene (0.2–0.5%) and β-caryophyllene (1–2%).

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

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

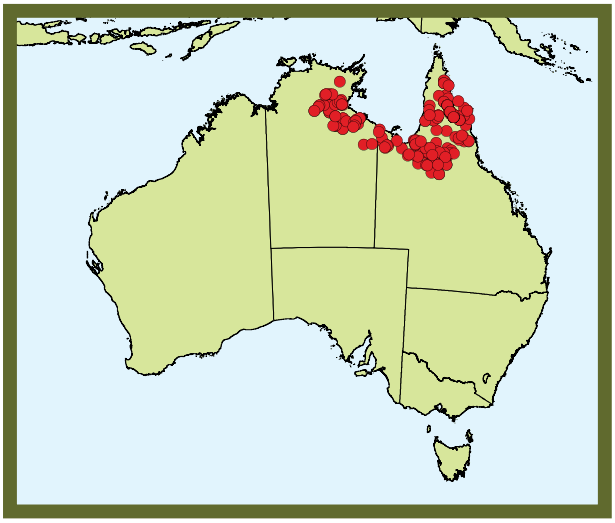
NOTES: This species should not be confused with *M. citrina* Turcz., a lemon yellow–flowered species from the southern part of south-western Western Australia. *Melaleuca citrina* Turcz. is now called *M. lutea.*

A hardy and adaptable species, *M. citrina* (Curtis) Dum.-Cours. is widely cultivated for its showy flowers, and there are many named selections available in horticulture. In the wild, it may hybridise with other species and the resulting progeny can give rise to apparently genetically stable, morphologically intermediate entities. Apomixis may play a role in the development of such entities but additional research is required to demonstrate the processes involved.



Melaleuca ***citrolens*** Barlow

PUBLICATION: *Brunonia* 9: 168, figs 1g–i, 2c (1987)
DERIVATION: *citrolens*, from *Citrus*, a genus of Rutaceae, and the Latin *olens*, smelling, odorous, apparently in reference to the aromatic foliage of this species
DESCRIPTION: *Tree or shrub* 2.5–10 m tall; bark papery, grey or white. *Branchlets* glabrescent, sericeous-lanuginulose (variable, sometimes either the longer sericeous or the shorter lanuginulose (to minutely sericeous) hairs predominating). *Leaves* alternate, 24–90 mm long, 2.5–9 mm wide, 5–30 times as long as wide, short-petiolate to subsessile; blade glabrescent to hairy, the hairs as on the branchlets, narrowly obovate, linear-obovate, narrowly elliptic or linear-elliptic, in transverse section transversely linear or oblunate, the base attenuate, the apex narrowly acute, rounded or acuminate, the veins longitudinal, 5, *oil glands* dense, distinct to obscure, scattered. *Inflorescences* capitate, lateral or sometimes pseudoterminal, with 1–15 monads, 7–15 mm wide. *Hypanthium* hairy, 1.1–1.5 mm long. *Calyx lobes* abaxially hairy or rarely glabrous, 0.7–0.9 mm long, scarious in a marginal band 0–1 mm wide. *Petals* caducous or rarely deciduous, 1.1–1.4 mm long. *Stamens* 7–11 per bundle; filaments cream to white, 2.5–5.9 mm long, the bundle claw 1.6–2.6 mm long, 0.4–0.6 times as long as the filaments. *Style* 6.1–7.7 mm long. *Ovules* 12–18 per locule. *Fruit* 1.5–2.3 mm long, the calyx lobes persistent or deciduous; cotyledons obvolute to almost planoconvex.
NATURAL OCCURRENCE: Northern Territory, Queensland: from north-eastern Northern Territory eastwards to Cape York Peninsula in Queensland.
ECOLOGY: Recorded as occurring in mixed woodland, open forest, *Melaleuca* woodland, vine thickets, seasonal swamps, stony ridges, on sandy soils, laterite, and clay soils.
FLOWERING TIME: Recorded as flowering from December to February, and from April to June.
ESSENTIAL OILS: Despite its name, *M. citrolens* appeared to have many non lemon-scented varieties. It is, in fact, a very variable species, chemically speaking. While it may not be strictly true to call every form a chemotype, at least six chemical forms were discerned in which one compound predominated or was significant. These six forms were: (a) 1,8-cineole (33–56%), terpinolene (5–30%) and α-terpineol (5–8%); (b) 1,8-cineole (8–32%), terpinolene (13–20%) and piperitenone (9–16%); (c) citronellal (10–24%), 1,8-cineole (20–30%) and isopulegol (15–25%); (d) methyl citronellate (9–31%) and citronellol (21–47%); (e) methyl cinnamate (19–24%), neral (12–23%) and geranial (14–23%); and (f) neral (8–32%), geranial (10–45%); citronellic acid (2–16%), spathulenol (5–9%) and 1,8-cineole (15–20%).
OIL YIELD: The oil yields varied from 3–6% (w/w, dry weight) for form (b) down to 2–4% (w/w, dry weight) for the others.
REFERENCES ON ESSENTIAL OILS: Brophy and Clarkson 1989; Brophy and Doran 1996; Brophy 1999



Melaleuca ***clarksonii*** Barlow

PUBLICATION: in Craven & Barlow, *Novon* 7: 114, fig. 1E–H (1997)

DERIVATION: *clarksonii*, in honour of John Richard Clarkson (1950–), a botanist in northern Queensland, Australia, and a co-collector of the type specimens of this species

DESCRIPTION: *Tree* 3–10 m tall; bark fibrous and hard, sometimes papery. *Branchlets* hairy to glabrescent, minutely sericeous. *Leaves* alternate, 30–110 mm long, 7–30 mm wide, 3.3–9 times as long as wide, long-petiolate; blade hairy to glabrescent, minutely sericeous, narrowly elliptic, elliptic, narrowly obovate or obovate, in transverse section transversely linear or oblunate, the base attenuate, the apex acuminate to narrowly acute, the veins longitudinal, 5–9, *oil glands* dense, obscure, scattered. *Inflorescences* spicate, pseudoterminal, with 9–15 triads, up to 18 mm wide. *Hypanthium* glabrous (rarely with very few scattered puberulous hairs), 1.4–1.8 mm long. *Calyx lobes* abaxially glabrous, 0.7–1.2 mm long, scarious in a marginal band 0.1–0.2 mm wide. *Petals* deciduous, 1.5–2.5 mm long. *Stamens* 6–9 per bundle (rarely a filament is inserted at the very base of a bundle claw, seemingly between the bundles); filaments creamy-white, 6–7 mm long, the bundle claw 1.5–3 mm long, 0.3–0.4 times as long as the filaments. *Style* 8–8.5 mm long. *Ovules* c. 20–30 per locule. *Fruit* 2–3.5 mm long, the calyx lobes deciduous; cotyledons obvolute.

NATURAL OCCURRENCE: Queensland: Cape York Peninsula.

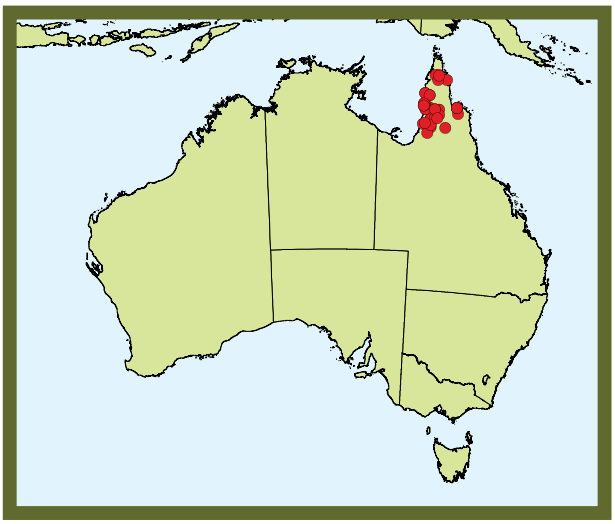
ECOLOGY: Recorded as occurring in low open *Melaleuca* forest, open forest/woodland, seasonal swamps, on silty clay loam, and cracking clay pans.

FLOWERING TIME: Recorded as flowering in May.

ESSENTIAL OILS: The leaf oil of this species contained significant amounts of both mono- and sesquiterpenes. The principal monoterpenes were 1,8-cineole (4–12%), α-pinene (1–5%) and α-terpineol (5–10%). The principal sesquiterpenes were globulol (16–23%), viridiflorol (9–13%), spathulenol (2–5%), β-caryophyllene (4–8%) and bicyclogermacrene (2–6%).

OIL YIELD: The oil yield (dry weight, w/w) was 0.6–1.0%.

REFERENCE ON ESSENTIAL OILS: Brophy and Doran 1996



Melaleuca ***clavifolia*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 868 (1999)

DERIVATION: *clavifolia*, from the Latin *clava*, club, and *folium*, leaf, in reference to a common leaf shape in this species

DESCRIPTION: *Shrub* 0.3–1 m tall. *Branchlets* glabrescent or rarely glabrous (when present, the hairs pubescent to more or less puberulous or sometimes lanuginulose-puberulous to lanuginulose as well, overlaid with sparser and much longer pubescent hairs). *Leaves* alternate, 3.8–10 mm long, 0.5–0.9 mm wide, 6–20 times as long as wide, subsessile; blade glabrescent or rarely glabrous (when present, the hairs pubescent or rarely more or less sericeous overlaid with sparser and much longer pubescent hairs), linear or linear-obovate, in transverse section transversely elliptic or rarely depressed obovate, the base narrowly cuneate to parallel (blade width equals petiole width), the apex obtuse to rounded, the veins longitudinal, 3, *oil glands* moderately dense, distinct to obscure, more or less in rows. *Inflorescences* capitate or shortly spicate, pseudoterminal and sometimes also upper axillary, with 4–9 triads, up to 23 mm wide. *Hypanthium* hairy or rarely glabrous (including the ovary), 1.2–1.6 mm long. *Calyx lobes* abaxially hairy, 0.6–1 mm long, scarious throughout or rarely scarious in a marginal band 0.2–0.4 mm wide. *Petals* deciduous, 1.3–2.2 mm long. *Stamens* 5–7 per bundle; filaments purple, mauve or magenta, 7.5–9.5 mm long, the bundle claw 2.5–5 mm long, 0.3–0.5 times as long as the filaments. *Style* 9.5–11.5 mm long. *Ovules* 15–20 per locule. *Infructescences* globose. *Fruit* 2–3 mm long, with sepaline teeth (these sometimes weakly developed); cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Coorow – Green Head – Moore River district.

ECOLOGY: Recorded as occurring in low open forest, low heath, woodland, on sandy loam.

FLOWERING TIME: Recorded as flowering from October to December.

ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal components were limonene (57.0%), α-pinene (14.2%) β-pinene (9.5%) and E-β-ocimene (7.0%). There were lesser amounts of myrcene (2.9%), terpinolene (1.1%) and α-terpineol (1.2%). Sesquiterpenes were neither prominent in number nor plentiful, with the main contributors being globulol, viridiflorol, spathulenol and β-eudesmol (all <0.5%).

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

Melaleuca ***cliffortioides*** Diels

PUBLICATION: in Diels & Pritzel, *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 35: 427 (1904)

DERIVATION: *cliffortioides*, from *Cliffortia*, a genus of Rosaceae, and the Greek *-oides*, resembling, in reference to a perceived similarity between this species and a species of *Cliffortia*

DESCRIPTION: *Shrub* 0.8–1.6 m tall. *Branchlets* hairy, puberulous to subvelutinulous. Leaves alternate, 4–9 mm long, 1.6–2.5 mm wide, 2.2–5 times as long as wide, subsessile to sessile; blade glabrescent, puberulous to subvelutinous or sometimes appressed-puberulous with pubescent hairs on the margin, narrowly ovate to ovate, in transverse section lunate to supervolute-curved, the base cuneate to truncate, the apex acuminate to narrowly acute, the veins longitudinal, 9–11, *oil glands* dense or moderately dense, distinct, scattered or in rows. *Inflorescences* subcapitate, lateral, with 1 monad, up to 12 mm wide. *Hypanthium* hairy, 2–2.5 mm long. *Calyx lobes* abaxially hairy, costate, 0.9–1.3 mm long, herbaceous to the margin or scarious in a marginal band up to 1 mm wide. *Petals* deciduous, 2.2–2.8 mm long. *Stamens* 8–13 per bundle; filaments white or cream, 8.5–10 mm long, the bundle claw 4.6–6 mm long, 0.5 times as long as the filaments. *Style* c. 13 mm long. *Ovules* c. 20–40 per locule. *Fruit* 4–5 mm long, with sepaline teeth; cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: from the Ravensthorpe district to the Norseman district.

ECOLOGY: Recorded as occurring in open eucalypt woodland, tall mallee shrubland, on red loamy clay over granite, and gravelly sandy loam.

FLOWERING TIME: Recorded as flowering in September.

ESSENTIAL OILS: This species presented a predominantly sesquiterpenoid leaf oil. The principal monoterpene detected was α-pinene (19.1%). The only other monoterpenes of consequence were β-pinene (1.0%), trans-pinocarveol (1.1%) and α-terpineol (0.7%). Two major oxygenated sesquiterpenes were present, $C_{15}H_{24}O$ (32.4%) and $C_{15}H_{26}O_2$ (20.4%), and these were accompanied by three other oxygenated sesquiterpenes, two of formula $C_{15}H_{24}O$ (2.2% and 9.4%) and one of formula $C_{15}H_{26}O_2$ (2.4%), as well as other oxygenated sesquiterpenes present in small amounts. These compounds remain, at present, unidentified.

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

Melaleuca ***coccinea*** A.S.George

PUBLICATION: *Western Australian Naturalist* 10: 28, figs A–J (1966)

DERIVATION: *coccinea*, from the Latin *coccineus*, deep red, crimson, in reference to the flower colour of this species

DESCRIPTION: *Shrub* to 2 m tall. *Branchlets* hairy to glabrescent, subvelutinulous to puberulous. *Leaves* decussate, peltate, 4.75–11 mm long, 2.5–5.5 mm wide, 1.5–2.2 times as long as wide, sessile; blade hairy to glabrescent, indumentum velutinulous to subvelutinulous, elliptic or ovate, in transverse section sublunate or strongly sublunate, the base cuneate or subcordate, the apex acute or broadly acute, the veins longitudinal, 9–15, *oil glands* moderately dense, distinct, scattered. *Inflorescences* spicate, lateral on secondary shoots, with 7–14 triads, up to 50 mm wide. *Hypanthium* hairy, 1.8–2.1 mm long. *Calyx lobes* abaxially hairy, costate, 1.4–1.8 mm long, scarious in a marginal band c. 0.1 mm wide. *Petals* caducous, 3–4.5 mm long. *Stamens* 11–15 per bundle; filaments crimson, 20–22 mm long, the bundle claw 8–14 mm long, 0.6 times as long as the filaments. *Style* 20–22 mm long. *Ovules* 35–40 per locule. *Fruit* 3.5–5 mm long, with sepaline teeth or the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Kalgoorlie–Norseman–Chifley district.

ECOLOGY: Recorded as occurring in sparse shrubland, and on sand near outcropping granite.

FLOWERING TIME: Recorded as flowering from November to January.

ESSENTIAL OILS: The leaf oil of this species contained comparable amounts of both monoterpenes and sesquiterpenes. The principal monoterpenes were α-pinene (9.1%) and 1,8-cineole (12.8%). These were accompanied by lesser amounts of β-pinene (3.1%), limonene (2.2%), α-terpineol (2.9%) and trans-pinocarveol (0.7%). The main sesquiterpenes encountered were γ-eudesmol (8.3%), α-eudesmol (9.9%), β-eudesmol (25.6%) and several unidentified oxygenated sesquiterpenes (each <3.0%).

OIL YIELD: The oil yield (fresh weight, w/w) was 1.9%.

NOTES: This species has adapted well to cultivation in Australia as an ornamental shrub in regions with a dry temperate climate and possesses a degree of frost tolerance.

Melaleuca comboynensis (Cheel) Craven

PUBLICATION: *Novon* 16: 471 (2006)
DERIVATION: *comboynensis*, from the locality Comboyne Ranges, New South Wales
SYNONYM: *Callistemon comboynensis* Cheel
DESCRIPTION: *Shrub or tree* 0.3–5 m tall; bark hard. *Branchlets* glabrescent, pubescent overlaid with more or less sericeous-pubescent hairs, or the shorter hairs somewhat lanuginulose-pubescent grading to pubescent. *Leaves* alternate, 27–95 mm long, 7–17 mm wide, 3.5–8 times as long as wide, long- or short-petiolate; blade glabrescent, sericeous, more or less lanuginose, or lanuginose-pubescent, narrowly elliptic, narrowly obovate, elliptic or obovate, in transverse section transversely linear, obsublunate or sublunate, the base very narrowly attenuate or very narrowly cuneate, the apex very shortly acuminate or acute, the veins pinnate, 10–20, *oil glands* moderately dense, dense or sparse, obscure or distinct, scattered. *Inflorescences* spicate, interstitial (the leaves distal to the inflorescence reduced in size), with 15–50 monads, 40–65 mm wide. *Hypanthium* hairy or glabrescent, 3.2–4.5 mm long. *Calyx lobes* abaxially hairy or glabrescent, 1.5–2.5 mm long, herbaceous to the margin. *Petals* deciduous, 3.9–6.1 mm long. *Stamens* 31–41 per flower; filaments red or bright crimson, 18–27 mm long; anthers purple to almost black. *Style* 20–34 mm long. *Ovules* c. 100–200 per locule. *Fruit* 4.1–7 mm long, the calyx lobes persistent or deciduous; cotyledons obvolute.
NATURAL OCCURRENCE: Queensland, New South Wales: montane country from the border ranges to the Gibraltar Range area.
ECOLOGY: Recorded as occurring in mountain heath, eucalypt forest along cliff line, margin of wet sclerophyll forest, along rocky watercourses, shrubland in crevices and pockets on massive rock outcrops, crevices on cliff, heath in gutters of rocky domed mountain top, on granite, and rhyolite.
FLOWERING TIME: Recorded as flowering from March to December.
ESSENTIAL OILS: The leaf oil of this species was dominated by monoterpenes. The principal components were α-pinene (28.3%) and 1,8-cineole (42.9%). These were accompanied by lesser amounts of limonene (5.6%), α-terpineol (6.2%), p-cymene (2.5%) and linalool (0.5%). Sesquiterpenes, while numerous, were not plentiful, with the principal components being β-caryophyllene (0.7%), globulol (1.2%) and spathulenol (1.1%).
OIL YIELD: The oil yield (fresh weight, w/w) was 0.1%.
REFERENCE ON ESSENTIAL OILS: Brophy et al. 1998, as *Callistemon comboynensis*
NOTES: This bottlebrush species is moderately well known in cultivation in Australia, where it is regarded as a hardy ornamental for temperate regions.

Melaleuca ***concinna*** Turcz.

PUBLICATION: *Bulletin de la classe physico-mathématique de l'Académie Impériale des Sciences de Saint-Pétersbourg* 10: 339 (1852)

DERIVATION: *concinna*, from the Latin *concinnus*, neat, pretty, elegant, in reference to the appearance of the species

DESCRIPTION: *Shrub* 0.3–1.5 m tall. *Branchlets* glabrescent, minutely sericeous to sericeous or pubescent to more or less sericeous-pubescent. *Leaves* alternate, 3.5–13 mm long, 1–1.8 mm wide, 3–12 times as long as wide, subsessile to short-petiolate; blade glabrescent, minutely sericeous to sericeous or more or less sericeous-pubescent, very narrowly obovate, narrowly obovate, suboblong, linear-obovate or linear, in transverse section transversely elliptic, depressed obovate or semicircular to almost semi-transversely elliptic, the base narrowly cuneate or rounded, the apex obtusely shortly acuminate, acuminate, rounded or acute, the veins longitudinal, 3, *oil glands* moderately dense or dense, obscure, more or less in rows or in rows. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 4–9 triads, up to 17 mm wide. *Hypanthium* hairy, 1–1.8 mm long. *Calyx lobes* abaxially hairy or glabrous, 0.3–0.6 mm long, scarious throughout or scarious in a marginal band 0.1–0.3 mm wide. *Petals* deciduous, 0.8–1.5 mm long. *Stamens* (2–)3–5 per bundle; filaments pink, purple or mauve, 3–8 mm long, the bundle claw 0.9–1.7 mm long, 0.2–0.3 times as long as the filaments. *Style* 4.5–8 mm long. *Ovules* c. 8–10 per locule. *Infructescences* globose (rarely approaching 'peg-fruited'). *Fruit* 2–3 mm long, with weakly developed sepaline teeth or the calyx lobes weathering away; cotyledons planoconvex.

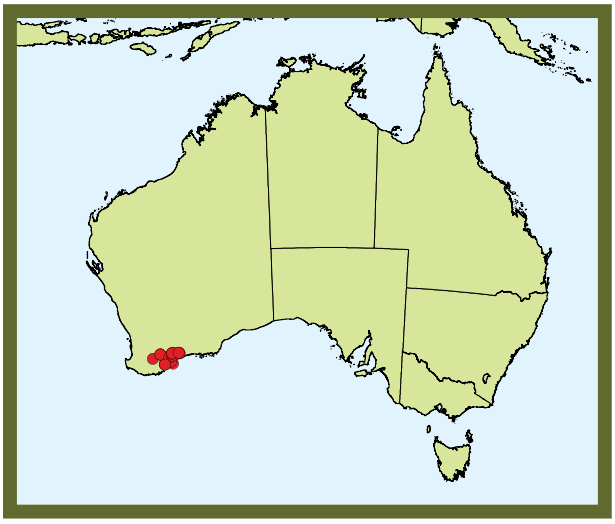
NATURAL OCCURRENCE: Western Australia: the South Stirling – Jerramungup – Ravensthorpe district.

ECOLOGY: Recorded as occurring in tall mallee scrub, heathland, high shrubland, and on sand over clay or laterite or granite.

FLOWERING TIME: Recorded as flowering from September to January.

ESSENTIAL OILS: This species presented a predominantly monoterpenoid oil. The principal monoterpenes were α-pinene (31.9%) and 1,8-cineole (11.6%). These were accompanied by lesser amounts of linalool (3.1%), limonene (1.9%), β-pinene (1.1%) and α-terpineol (2.5%). The principal sesquiterpenes present were viridiflorene (2.1%), globulol (7.6%), viridiflorol (5.6%), spathulenol (1.9%), E,E-farnesal (7.7%), and cubeban-11-ol (3.4%).

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



Melaleuca **concreta** F.Muell.

PUBLICATION: *Fragmenta phytographiae Australiae* 3: 118 (1862)

DERIVATION: *concreta*, from the Latin *concretus*, grown together, condensed, in reference to the tightly packed fruit of this species

DESCRIPTION: *Shrub* to 6 m tall; bark papery, peeling-flaking. *Branchlets* glabrescent, with sericeous or spreading-ascending to spreading pubescent hairs. *Leaves* spreading-ascending or ascending, 17–112 mm long (often 30–70), 0.9–3.7 mm wide, 14–102 times as long as wide (often 20–60), petiole 0.5–2 mm long; blade glabrescent, sericeous or spreading-ascending to spreading pubescent, linear, linear-obovate, narrowly obovate or linear-elliptic, in transverse section transversely linear, sublunate, depressed obovate or depressed angular-obovate, in lateral view straight or incurved, the base very narrowly cuneate, the apex narrowly acuminate, acuminate, obtusely shortly acuminate or aristate, *oil glands* scattered. *Inflorescences* capitate, with 4–18 triads. *Hypanthium* 0.8–1.3 mm long, 0.8–1.5 mm wide. *Calyx lobes* 5, indistinctly free, abaxially glabrous, 0.2–0.5 mm long. Petals usually deciduous or sometimes caducous, broadly ovate to subcircular, 0.9–2.1 mm long, oil glands subcircular to circular, elliptic or rarely linear. *Stamens* 3–9 per bundle (usually 5–7), the filaments cream to white, or yellow, 4.2–9.2 mm long, the bundle claw 1.2–4.3 mm long, 0.3–0.6 times as long as the filaments. *Style* 4.5–9.4 mm long. *Ovules* 15–20 per locule. *Infructescences* longer than wide to as wide as long (rarely shorter than wide), 6–9.8 mm wide, the constituent fruits closely packed and not retaining a significant separate identity (the fruiting hypanthia closely packed for their full length). Seeds 0.6–0.9 mm long, the cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: from the lower Murchison River district southwards to the Cataby – Regans Ford district.

ECOLOGY: Recorded as occurring in heath, shrubland, scattered mallees with shrubs, mallee–acacia–melaleuca vegetation, *Melaleuca* shrubland, low heath, *Banksia* woodland, on grey sand, brown clayey sand over sandstone, yellow sandy loam, sandy slopes below laterite jump-up, drainage line with (currently saturated) greyish sand, yellow sand dune, lateritic pale (red) brown loam, slightly saline clay loam, white loamy clay seepage slope, and laterite.

FLOWERING TIME: Recorded as flowering from August to November.

ESSENTIAL OILS: The leaf oil of this species was variable, with monoterpenes predominating. Two chemotypes appeared to be present. Chemotype I (only in LAC 10210) contained terpinen-4-ol (35.4%) as its principal component, with lesser amounts of γ-terpinene (12.6%), α-terpinene (7.3%), sabinene (8.3%) and α-pinene (4%). The sesquiterpene in greatest abundance was spathulenol (1.8%) and all told they accounted for <3% of the oil. Chemotype II (in both LAC 10210 and 10219) contained 1,8-cineole (28–82%, the majority >58%) as the principal component. This was accompanied by lesser amounts of α-pinene (4–21%, the majority >8%), limonene (2–5%), terpinen-4-ol (1–2%) and α-terpineol (1–3%). Sesquiterpenes did not contribute much to the oil, with spathulenol (0.3–4.0%), globulol (0.4–12.0%, the majority <2.0%) and bicyclogermacrene (0.3–3.0%) being the principal components.

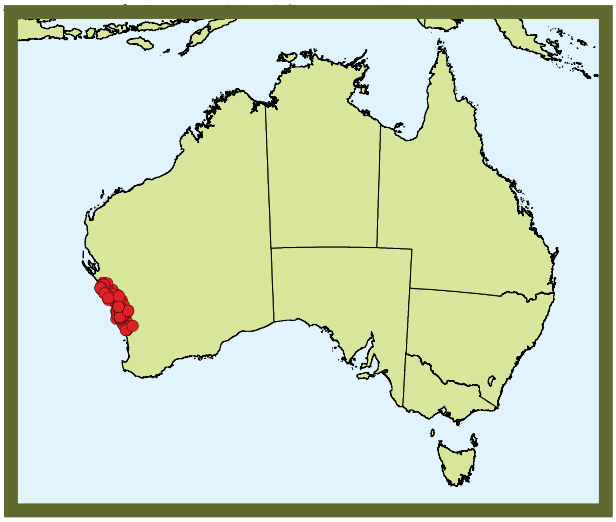
OIL YIELD: The oil yield (dry weight, w/w) was 0.8–2.2%.

REFERENCE ON ESSENTIAL OILS: Brophy et al. 2006b

NOTES: This is the most variable species of the broom-bush complex and the species includes many populations

that have distinctive morphologies. Although variation in leaf length is high between the populations, there are several unifying features, notably the infructescence usually being somewhat spicate and the leaves being broader than thick. It appears that there are many local variants adapted to particular local conditions. The chemotype containing significant amounts of terpinen-4-ol is of interest as a medicinal essential oil source although, since this analysis is on only one sample, an investigation within the species would be required to check on oil yield and the variation in the amount of this compound present.

It is not known if this species has ever been harvested for making brushwood fencing. Selected forms may well be useful as ornamentals in regions with a Mediterranean climate. Given that it has a very broad ecological amplitude and is morphologically variable, it should be possible to select forms to fit several landscape profiles.



Melaleuca ***condylosa*** Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 869 (1999)

DERIVATION: *condylosa*, from the Greek *kondylos*, knob, prominence, in reference to the knobbly infructescence that often occurs in this species

DESCRIPTION: *Shrub* 0.3–3 m tall; bark papery. *Branchlets* glabrescent, more or less retrorsely pubescent. Leaves alternate, 9.5–32 mm long, 1.3–2.1 mm wide, 6–15 times as long as wide, short-petiolate to subsessile; blade glabrescent, more or less retrorsely pubescent, linear-obovate or linear, in transverse section semicircular to transversely semielliptic, depressed obovate or transversely elliptic, the base attenuate, the apex shortly acuminate, the veins longitudinal, 3, *oil glands* moderately dense, distinct to obscure, scattered. *Inflorescences* capitate, pseudoterminal, with 6–11 triads, up to 20 mm wide. *Hypanthium* hairy, 1.2–1.5 mm long. *Calyx lobes* abaxially hairy, 0.2–0.5 mm long, scarious throughout. *Petals* deciduous, 1.2–2 mm long. *Stamens* 5–7 per bundle; filaments pale yellow (ageing to pinkish), 5–6.5 mm long, the bundle claw 1.9–2.8 mm long, 0.3–0.5 times as long as the filaments. *Style* 7–8.5 mm long. *Ovules* c. 15 per locule. *Infructescences* globose. *Fruit* 2–2.5 mm long, the calyx lobes weathering away (protuberances on fruit are not sepaline teeth); cotyledons planoconvex.

NATURAL OCCURRENCE: Western Australia: the Narembeen–Kondinin–Hyden district.

ECOLOGY: Recorded as occurring in mallee–*Melaleuca* shrubland, low open mallee woodland, sand plain vegetation, on yellow-brown loam, and sandy loam.

FLOWERING TIME: Recorded as flowering in October and November.

ESSENTIAL OILS: This species presented a predominantly monoterpenoid oil. The principal components were 1,8-cineole (30–39%) and α-pinene (11–27%). These were accompanied by limonene (2–3%), α-terpineol (3–5%) and β-pinene (0.7–2.0%). Sesquiterpenes, while numerous, were individually present in small amounts with the principal contributors being globulol (4–10%), viridiflorol (1–5%), γ-eudesmol (4–8%), α-eudesmol (2–6%) and β-eudesmol (3–7%).

OIL YIELD: The oil yield (fresh weight, w/w) was 0.3–1.0%.

Melaleuca ***conothamnoides*** C.A.Gardner

PUBLICATION: *Journal of the Royal Society of Western Australia* 47: 61 (1964)

DERIVATION: *conothamnoides*, from *Conothamnus*, a genus of Myrtaceae, and the Greek *-oides*, resembling, in reference to a perceived similarity between this species and a species of *Conothamnus*

DESCRIPTION: *Shrub* 0.3–1.5 m tall. *Branchlets* glabrescent (sometimes rapidly so), sericeous-pubescent to pubescent. *Leaves* alternate, (11–)24–45 mm long, 4–11 mm wide, 2–5 times as long as wide, subsessile to short-petiolate; blade glabrescent, sericeous to sericeous-pubescent and often lanuginose-pubescent on the margins, narrowly obovate, oblong, narrowly elliptic to elliptic, obovate or ovate, in transverse section transversely linear, the base attenuate, narrowly cuneate to cuneate or rounded, the veins longitudinal, 5(–7), *oil glands* dense or moderately dense, obscure to distinct, scattered. *Inflorescences* capitate or shortly spicate, pseudoterminal and sometimes also upper axillary, with 8–15 triads, up to 35 mm wide. *Hypanthium* hairy, 1.8–2.5 mm long. *Calyx lobes* abaxially glabrous, 0.3–0.7 mm long, scarious in a marginal band 0.1–0.3 mm wide. *Petals* deciduous, 2–4 mm long. *Stamens* 7–9 per bundle; filaments purple, magenta or rarely pink, 8.5–14.5 mm long, the bundle claw 2.5–5.6 mm long, 0.2–0.5 times as long as the filaments. *Style* 11–19.5 mm long. *Ovules* 8–20 per locule. *Infructescences* globose. *Fruit* 2.5–4 mm long, the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: from the Arrino – Mt Gibson district south to the Toodyay–Youngedin district, and east to the Comet Vale – Coolgardie district.

ECOLOGY: Recorded as occurring in open shrubland, sand plain, *Casuarina* thicket, low heath, eucalypt woodland, dense shrubland, on sandy loam over granite, sandy clay over laterite, and red loam.

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

ESSENTIAL OILS: The leaf oil of this species contained both mono- and sesquiterpenes but monoterpenes predominated. The principal monoterpenes were 1,8-cineole (21–35%), β-pinene (9–23%) and α-pinene (13–24%). These were accompanied by lesser amounts of limonene (1–3%), terpinen-4-ol (0.5–2.0%) and α-terpineol (3–5%). The principal sesquiterpenes were globulol (2–8%), viridiflorol (1–3%), spathulenol (2–6%) and α-cadinol (0.7–2.0%).

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

NOTES: This very attractive shrub has been successfully grown in Australia in areas with a Mediterranean climate but Holliday (2004) reported it is not easy to grow in summer rainfall areas.

Melaleuca cordata Turcz.

PUBLICATION: *Bulletin de la classe physico-mathématique de l'Académie Impériale des Sciences de Saint-Pétersbourg* 10: 339 (1852)

DERIVATION: *cordata*, from the Latin *cordis*, heart, hence *cordatus*, heart-shaped, in reference to the leaf shape

DESCRIPTION: *Shrub* 0.3–3 m tall; bark fibrous, grey. *Branchlets* glabrescent, pubescent to sericeous-pubescent or rarely sericeous. *Leaves* alternate, 7.5–30 mm long, 6.5–30 mm wide, 0.8–1.8 times as long as wide, subsessile to short-petiolate; blade soon glabrescent, pubescent to less often sericeous-pubescent or rarely with some sericeous hairs and occasionally lanuginose-pubescent distally and on the margins, broadly ovate to ovate, in transverse section transversely linear, the base cordate, subcordate or rounded, the apex acuminate, obtusely shortly acuminate or rounded, the veins longitudinal, 5–7(–9), *oil glands* moderately dense, distinct to obscure, scattered. *Inflorescences* capitate or shortly spicate, pseudoterminal and often also upper axillary, sometimes lateral below the leaves, with 7–19 triads, up to 35 mm wide. *Hypanthium* hairy, 1.5–2 mm long. *Calyx lobes* abaxially glabrous, 0.2–0.5 mm long, scarious in a marginal band 0.05–0.2 mm wide. *Petals* deciduous, 1.3–3 mm long. *Stamens* 7–12 per bundle; filaments purple to mauve, pink or magenta, 8.8–14 mm long, the bundle claw (1.3–)2–4.5 mm long, 0.1–0.4 times as long as the filaments. *Style* 11–14 mm long. *Ovules* c. 5–12 per locule. *Infructescences* globose. *Fruit* 2–4 mm long, the calyx lobes weathering away; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: widespread from the southern Shark Bay district south-eastwards to the Esperance district.

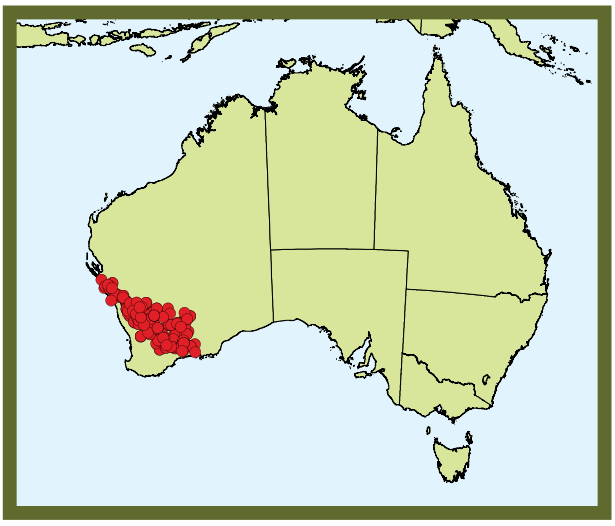
ECOLOGY: Recorded as occurring in mallee heath, mallee woodland, sand plain, *Casuarina* thicket, closed shrubland, on lateritic sandy clay, and granite.

FLOWERING TIME: Recorded as flowering from March to January.

ESSENTIAL OILS: This species produced a variable oil, with either both monoterpenes and sesquiterpenes being prevalent or only monoterpenes being prominent compounds. For the first chemical form, the principal monoterpenes were α-pinene (14.6%) and 1,8-cineole (12.2%). There were lesser amounts of β-pinene (1.8%), trans-pinocarveol (1.7%), linalool (1%) and α-terpineol (1.7%). The principal sesquiterpenes were γ-eudesmol (14.5%), β-eudesmol (17.5%) and α-eudesmol (3.9%), with lesser amounts of globulol (1.6%), spathulenol (1.6%), allo-aromadendrene and α-muurolene (both 1.7%). The second chemical form produced α-pinene (25%) and 1,8-cineole (29.1%) as principal components. These were accompanied by lesser amounts of β-pinene (2.1%), limonene (2.2%) and α-terpineol (5.3%), and the sesquiterpenes spathulenol (3.7%), α-cadinol (3.1%), bicyclogermacrene (1.7%) and germacrene-D (1.5%).

OIL YIELD: The oil yield (fresh weight, w/w) of the first chemical form was 0.4%, while for the second form it was 0.7%.

REFERENCE ON ESSENTIAL OILS: Brophy and Lassak 1992



Melaleuca ***cornucopiae*** Byrnes

PUBLICATION: *Austrobaileya* 2: 74 (1984)

DERIVATION: *cornucopiae*, from the Latin *cornu*, horn, and *copiosus*, plentiful, abounding, in reference to the appearance of the inflorescence of this species, especially the male inflorescence, being somewhat horn-like due to the numerous floral units of the inflorescence being protected by overlapping bracts

DESCRIPTION: *Shrub or tree* 1–4 m tall; bark papery, grey. *Branchlets* glabrescent, silky-sericeous. *Leaves* alternate, 40–105 mm long, 4–15 mm wide, 6–15 times as long as wide, long-petiolate; blade glabrescent, sericeous, narrowly elliptic or narrowly obovate, in transverse section transversely linear, oblunate or lunate, the base attenuate to cuneate, the apex acute to rounded, the veins longitudinal, 3–7, *oil glands* moderately dense, obscure, scattered. *Inflorescences* spicate, pseudoterminal or sometimes interstitial, sometimes also lateral, with c. 10–50 triads, up to 15 mm wide. *Hypanthium* hairy, 1–1.5 mm long. *Calyx* absent. *Petals* deciduous, 1.9–2.2 mm long. *Stamens* 5 or 6 per bundle; filaments white, 4.5–5.9 mm long, the bundle claw 1.2–1.8 mm long, 0.3–0.4 times as long as the filaments. *Style* c. 7 mm long (in male flowers the gynoecium is absent). *Ovules* c. 30 per locule. *Fruit* 2.5–4 mm long; cotyledons obvolute.

NATURAL OCCURRENCE: Northern Territory: western Arnhem Land.

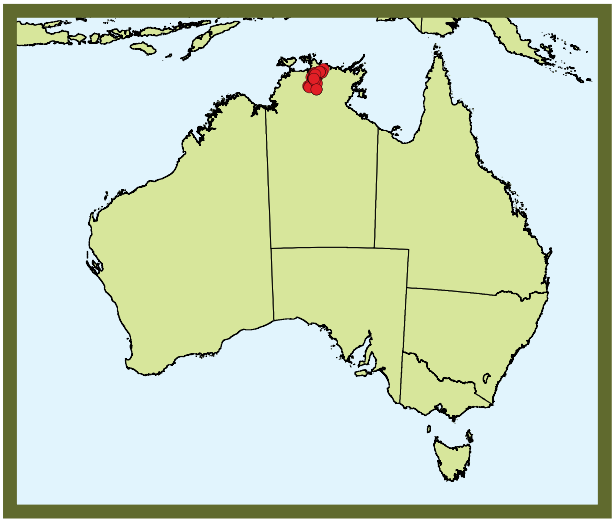
ECOLOGY: Recorded as occurring in mixed low woodland and eucalypt forest, low heath, and on skeletal sandy soils over sandstone.

FLOWERING TIME: Recorded as flowering from December to April.

ESSENTIAL OILS: This species presented a monoterpenoid oil. The principal monoterpenes encountered were α-pinene (21.9%), α-phellandrene (33.9%) and terpinolene (10.5%). These compounds were accompanied by lesser amounts of limonene (2.2%), E-β-ocimene (2.8%), γ-terpinene (3.2%) and p-cymene (3.0%). 1,8-cineole was not present. Sesquiterpenes were neither numerous nor plentiful, with the major members being globulol (3.0%), viridiflorol (1.1%), spathulenol (2.8%) and bicyclogermacrene (0.8%).

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

NOTES: *Melaleuca cornucopiae* is a useful ornamental shrub for the monsoonal tropics. Although the flowers are not dramatic, the unusual inflorescence may be very long, and the glossy leaves and branchlet bark are appealing.



Melaleuca croxfordiae Craven

PUBLICATION: in Craven & Lepschi, *Australian Systematic Botany* 12: 870 (1999)

DERIVATION: *croxfordiae*, in honour of Eileen Jessie Croxford (1912–2006), of Albany, Western Australia, whose field knowledge of the flora of the Albany district has been of benefit to botanical science

DESCRIPTION: *Tree or shrub* 1.5–5 m tall; bark papery. *Branchlets* glabrescent, sericeous. *Leaves* alternate, 14–60 mm long, 1.5–5.2 mm wide, 4–25 times as long as wide, short-petiolate; blade glabrescent, sericeous, linear-elliptic, linear-obovate, very narrowly elliptic, very narrowly obovate or narrowly elliptic, in transverse section transversely linear, the base attenuate, the apex acuminate, narrowly acuminate or narrowly acute to acute, the veins longitudinal, 5, *oil glands* moderately dense or dense, obscure, scattered. *Inflorescences* capitate, pseudoterminal and sometimes also upper axillary, with 5–12 triads, up to 22 mm wide. *Hypanthium* glabrescent or rarely glabrous, 1.5–2 mm long. *Calyx lobes* abaxially glabrous, 0.2–0.6 mm long, scarious throughout or rarely scarious in a marginal band 0.1–0.2 mm wide. *Petals* deciduous, 1.3–1.7 mm long. *Stamens* 5–8 per bundle; filaments white, cream or pale yellow, 6–9 mm long, the bundle claw 1.8–3(–3.8) mm long, 0.2–0.4(–0.5) times as long as the filaments. *Style* 7–11.5 mm long. *Ovules* c. 5–10 per locule. *Infructescences* globose. *Fruit* 3–4 mm long, the calyx lobes weathering away or sometimes replaced by weakly developed sepaline teeth; cotyledons obvolute.

NATURAL OCCURRENCE: Western Australia: the Manjimup–Albany district.

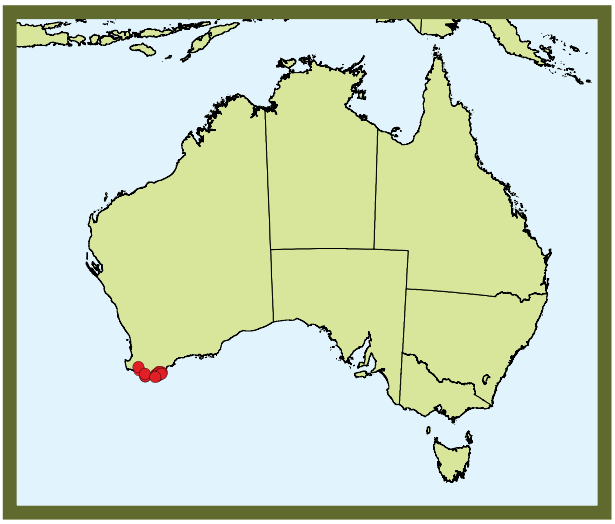
ECOLOGY: Recorded as occurring in shrubland on granite pavements, winter-wet swamps, mixed forest over sedges, on peaty sandy clay, grey sand, black peat over sand, and granite.

FLOWERING TIME: Recorded as flowering from October to December.

ESSENTIAL OILS: The leaf oil of this species was dominated by 1,8-cineole (51–61%). There were lesser amounts of limonene (4–6%), α-pinene (2–5%), β-pinene (1–3%), myrcene (0.9–2.0%), and α-terpineol (4–6%). There was a significant number of unidentified sesquiterpenes present in the oil, though in small amounts. The main sesquiterpenes encountered in the oil were globulol (2–7%) and several unidentified oxygenated sesquiterpenes (1–7%).

OIL YIELD: The oil yield (fresh weight, w/w) was 1.3%.

NOTES: Although this species comes from higher rainfall areas in southern Western Australia, Holliday (2004) records this species to have been successfully grown in dry clay soils in the Adelaide region of South Australia. It should be trialled in other areas as it may prove to be a useful addition to ornamental horticulture as is another species from the southern Western Australian area, i.e. *M. nesophila*.



Melaleuca ***ctenoides*** F.C.Quinn

PUBLICATION: in Cowley, Quinn, Barlow & Craven, *Australian Systematic Botany* 3: 194, fig. 11c (1990)

DERIVATION: *ctenoides*, from the Greek *ctenos*, comb, and *-oides*, resembling, in reference to the resemblance of the secund terete leaves of a growth flush projecting as do the teeth of a large comb

DESCRIPTION: *Shrub* 0.5–4 m tall. *Branchlets* glabrescent, lanuginulose. *Leaves* alternate, 10–35 mm long, 0.9–1.5 mm wide, (7.3–)10–35 times as long as wide, subsessile; blade glabrescent, lanuginulose, linear, linear-obovate or narrowly obovate, in transverse section transversely semielliptic, semicircular, depressed obovate or sublunate, the base attenuate to narrowly cuneate, the apex acuminate or acute, the veins longitudinal-pinnate, 1–3, *oil glands* moderately dense to sparse, obscure to distinct, scattered. *Inflorescences* spicate, lateral (pseudo-terminal on secondary shoots), with 10–20 monads, up to 25 mm wide. *Hypanthium* glabrous, 1.8–2.5 mm long. *Calyx lobes* abaxially glabrous; scarious in a broad marginal band, 0.1–0.4 mm wide, 1–1.3 mm long. *Petals* deciduous, 3–3.6 mm long. *Stamens* 14–18 per bundle; filaments mauve, 8.5–11 mm long, the bundle claw 4.2–6.3 mm long, 0.6–0.7 times as long as the filaments. *Style* 10–11 mm long. *Ovules* c. 70 per locule. *Fruit* 3.5–5 mm long, the calyx lobes abaxially replaced by sepaline teeth; cotyledons flattened planoconvex to planoconvex.

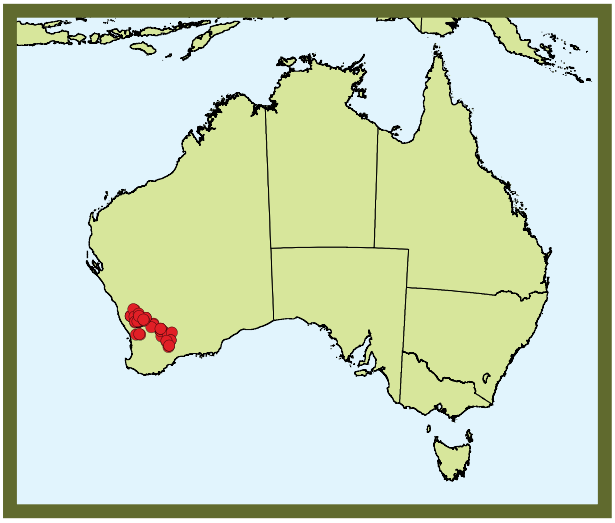
NATURAL OCCURRENCE: Western Australia: from the Maya district south to the Narembeen–Hyden district.

ECOLOGY: Recorded as occurring in dense tall heath with mallees, low closed heath, on sandy loam, sandy clay over laterite, and granite.

FLOWERING TIME: Recorded as flowering from September to November.

ESSENTIAL OILS: The leaf oil from this species was dominated by monoterpenes. The principal components were 1,8-cineole (67–76%), α-pinene (2–3%), limonene (5–10%), myrcene, β-pinene and γ-terpinene (each 1–2%), terpinen-4-ol (1–3%) and α-terpineol (3–5%). The only sesquiterpenes of greater than 1% were globulol (0.8–2.0%) and spathulenol (1–2%).

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



Melaleuca cucullata Turcz.

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

DERIVATION: *cucullata*, from the Latin *cucullus*, hood, in reference to the leaf blades superficially resembling little hoods

DESCRIPTION: *Shrub* 1–5 m tall. *Branchlets* soon glabrescent (the lanuginulose-puberulous hairs ephemeral). *Leaves* decussate or alternate (often both conditions occur within a seasonal growth unit), peltate, 1.7–5 mm long, 1.2–2.6 mm wide, 1.3–2.2 times as long as wide, sessile; blade glabrous or soon glabrescent (when present, the puberulous hairs ephemeral), ovate, broadly ovate, obovate, elliptic or subcircular, in transverse section depressed angular-obovate, strongly depressed obtriangular, depressed obovate or shallowly lunate, the base cuneate, rounded or truncate, the apex acute, broadly acute or obtuse, the veins longitudinal, 1–9, *oil glands* moderately dense, obscure, more or less in rows. *Inflorescences* spicate or subcapitate, pseudoterminal, with 4–10 triads, up to 15 mm wide. *Hypanthium* glabrous, 1–1.5 mm long. *Calyx lobes* abaxially glabrous, c. 0.5 mm long, herbaceous to the margin or scarious in a marginal band up to 0.05 mm wide. *Petals* deciduous, 1.3–1.5 mm long. *Stamens* 5–9 per bundle; filaments white or cream, rarely yellow, 3.2–5.5 mm long, the bundle claw 1.5–2.4 mm long, 0.3–0.5 times as long as the filaments. *Style* 4.5–5.5 mm long. *Ovules* 8–10 per locule. *Fruit* 2.5–4 mm long, the calyx lobes deciduous; cotyledons obvolute.

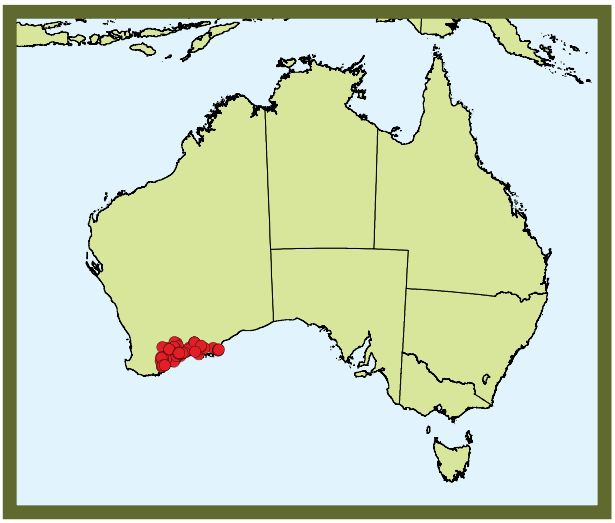
NATURAL OCCURRENCE: Western Australia: from the Lake Grace – Stirling Range district eastwards to the Israelite Bay district.

ECOLOGY: Recorded as occurring in mallee heath, open eucalypt forest with dense shrubby understorey, on laterite, sand, and quartzitic clay soil.

FLOWERING TIME: Recorded as flowering from September to December.

ESSENTIAL OILS: The leaf oil of this species was primarily a sesquiterpenoid oil, though the principal component was a monoterpene. The principal sesquiterpenes in the oil were spathulenol (7–11%), caryophyllene oxide (4–10%), β-eudesmol (2–12%), γ-eudesmol (1–12%), β-caryophyllene (1–8%) and viridiflorene (0.5–6%). The principal monoterpene was α-pinene (16–22%) and there were lesser amounts of β-pinene (0.8–2.0%), verbenone (1–2%) and α-terpineol (0.2–2.0%).

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



Melaleuca ***cuticularis*** Labill.

PUBLICATION: *Novae Hollandiae plantarum specimen* 2: 30, t. 171 (1806)

DERIVATION: *cuticularis*, from the Latin *cuticula*, cuticle, apparently in reference to the papery bark of this species

DESCRIPTION: ***Shrub or tree*** 1–10 m tall; bark papery, off-white or greyish-cream. ***Branchlets*** soon glabrescent (the lanuginulose-puberulous hairs ephemeral). ***Leaves*** decussate, 4–12 mm long, 1.2–3.5 mm wide, 2–7 times as long as wide, short-petiolate or subsessile; blade glabrous to early glabrescent (the lanuginulose-puberulous hairs ephemeral), very narrowly elliptic, very narrowly ovate, narrowly elliptic, narrowly ovate or narrowly obovate, in transverse section sublunate, shallowly lunate or semicircular, the base attenuate or rounded, the apex obtuse, broadly acute or acute, the veins longitudinal, 3–5, ***oil glands*** sparse, obscure, more or less in rows. ***Inflorescences*** capitate or subcapitate, pseudoterminal or terminal, with 1–3 monads, up to 20 mm wide. ***Hypanthium*** glabrous, 2.2–3 mm long. ***Calyx lobes*** abaxially glabrous, 2.5–3.3 mm long, herbaceous to (or almost to) the margin. ***Petals*** deciduous, 3.5–4.4 mm long. ***Stamens*** 19–23 per bundle; filaments white or cream; 6.5–8.8 mm long, the bundle claw 2.5–3.8 mm long, 0.4–0.5 times as long as the filaments. ***Style*** 8–9 mm long. ***Ovules*** 80–100 per locule. ***Fruit*** 3.8–4.5 mm long, with sepaline teeth; cotyledons flattened planoconvex.

NATURAL OCCURRENCE: Western Australia, South Australia: from the Perth district south to the Albany district and eastwards to the Israelite Bay district, Western Australia, and on Kangaroo Island, South Australia.

ECOLOGY: Recorded as occurring in *Melaleuca* shrubland, open eucalypt woodland, on the edge of saltwater inlets and saline lagoons, on loamy silt, sandy gravel, peaty soil, and sandy clay over granite.

FLOWERING TIME: Recorded as flowering from August to December, and also in February.

ESSENTIAL OILS: This species presented a monoterpenoid oil, though there were small amounts of acyl-phloroglucinol compounds present. The principal monoterpene found in the oil was 1,8-cineole (53–59%). This was accompanied by lesser amounts of α-pinene (6–15%), β-pinene (0.9–3.0%), limonene (5–7%), terpinen-4-ol (1–2%) and α-terpineol (1–2%). The principal sesquiterpenes encountered in the oil were globulol (1–3%), spathulenol (2–3%) and allo-aromadendrene (0.4–1.0%). Three aromatic compounds that, from their mass spectra, were considered to be acyl-phloroglucinol derivatives were also present in totals ranging from 3% to 6%. The principal one was identified as 2-hydroxy-4,6-dimethyl-(3 or 5)-methyl-isobutyrophenone.

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

NOTES: *Melaleuca cuticularis* is a species that would probably be useful in shelter belts etc. in moist to swampy temperate areas. It has some salt tolerance and might be valuable in the reclamation of salt-affected land.