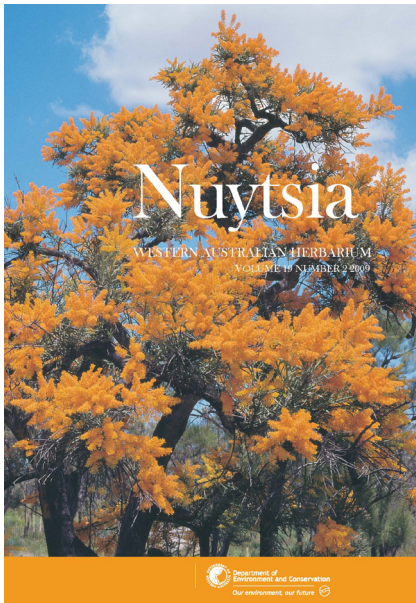


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## A new subspecies of *Acacia pentadenia* (Leguminosae: Mimosoideae) from south-western Australia

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### Abstract

Reid, J.E., Wardell-Johnson, G. & Maslin, B.R. A new subspecies of *Acacia pentadenia* (Leguminosae: Mimosoideae) from south-western Australia. *Nuytsia* 19(2): 245–252 (2009). A previously recognised informal variant of *Acacia pentadenia* Lindl. is described following extensive field and herbarium studies focused on the forest region to the north-east of Walpole. The new subspecies, *Acacia pentadenia* subsp. *syntoma*, is most readily distinguished from subsp. *pentadenia* by a combination of morphological attributes, as well as habit, phenological and ecological differences. Field observations have shown the two subspecies to be occasionally sympatric. A key to the subspecies is provided together with a distribution map and comparative images.

### Introduction

A low-growing variant of *A. pentadenia* with reflexed leaflets was noted by Maslin in his 1975 revision of *Acacia* series *Pulchellae* and in his 2001 *Flora of Australia* treatment of this group. Subsequent field studies in the Walpole-Denmark area by the second author (Wardell-Johnson) have shown this variant to be distinctive in the field and to have a restricted distribution to the north, east and north-east of Walpole, between the Deep and Kent Rivers. It is a small shrub (to c. 1.5 m tall) which grows in pale or yellow, gravelly duplex soils on low rises and in hilly terrain, and flowers from mid-August to late October. While typical *A. pentadenia* also occurs in the same region, and occasionally coexists with the variant, it is a taller plant that usually grows in brown, gravelly duplex soils and commences flowering 1–2 months later than the variant. The observed field differences between the two taxa prompted detailed sampling in 2008 of the region to the north-east of Walpole. Specimens from all known populations of the variant and selected populations of typical *A. pentadenia* were collected and, together with the existing collections at the Western Australian Herbarium, form the basis of the present study. The variant is clearly referable to *A. pentadenia* and although there is no single morphological attribute that characterises it, a combination of vegetative and floral characters normally enable the two taxa to be reliably distinguished. Despite the fact that a few specimens could not be confidently assigned, the variant was assessed to warrant formal recognition and is described below as a new subspecies of *A. pentadenia*.

## Taxonomy

**Acacia pentadenia** Lindley, *Edwards' Bot. Reg.* 18: t. 1521 (1832)

*Type citation*: 'Collected for Mr. Knight, on the south-west coast of New Holland. It is a very elegant greenhouse plant, flowering in April;'. *Type*: New Holland [Australia], *W. Baxter s.n.* (*lecto*: CGE, *vide* B.R. Maslin, *Nuytsia* 1: 444 (1975)).

**Acacia pentadenia** Lindl. subsp. **pentadenia**

?*Acacia neilii* Hort. ex Seem., *Verh. K.K. Gartenbauges Wien* 1846: 72 (1846). *Type citation*: No type cited. *Type*: n.v. Synonymy following K. Koch, *Berliner Allg. Gartenzeitung* 26: 195 (1858).

*Acacia biglandulosa* Meisn., in J.G.C. Lehmann, *Pl. Preiss.* 2: 205 (1848). *Type citation*: 'Swan River, Drummond. Coll. II. No. 97.' *Type*: Ad. Fluv. Cygnorum [Swan River, Western Australia] *Drummond* [2:] 97 (*holo*: BM (sheet labelled 'HERB. R.J. SHUTTLEWORTH.-Recd. 1877.').), *vide* B.R. Maslin & R.S. Cowan, *Nuytsia* 9: 403 (1994); *iso*: K, MEL, NSW, OXF, P, PERTH 00742090) (NB. Drummond's collection no. either absent or given incorrectly as collection 3 on isotypes).

**Acacia pentadenia** subsp. **syntoma** J.E.Reid, Wardell-Johnson & Maslin, *subsp. nov.*

Ab *Acacia pentadenia* subsp. *pentadenia* fruticibus 0.5–1.5 m altis, pinnis 2–3 parium, foliis 1–2.5(4) mm longis, pedunculis 3–7(–8) mm longis, capitulis 1–4 per axillum folii statim dignoscenda.

*Typus*. Corner of Middle Road and Boronia Road, north side, c. 12 km north of Bow Bridge, between Nornalup and Denmark, Western Australia, 11 September 2008, *M. Sowry & K. Bain* MS 116 (*holo*: PERTH 07987749; *iso*: CANB, K, MEL, NY).

*Shrubs* 0.5–1.5 m tall. *Branchlets* ribbed, glabrous or occasionally sub-glabrous with very sparse, short, straight, patent to antrorse hairs. *Stipules* sometimes  $\pm$ persistent, linear to linear-triangular, 2–4 mm long, sub-indurate, not pungent. *Pinnae* 2–3 pairs, 3–12 mm long (lowermost pinnae) otherwise 25–85 mm long; *petiole* 1–2(–5) mm long; *rachis* 7–30 mm long, prominently ribbed on upper surface; *leaflets* 1–3 pairs (lowermost pinnae) otherwise 12–30(–36) pairs, obliquely oblong to oblong-elliptic or sometimes approaching triangular, flat or shallowly concave, the margins and apex often slightly recurved (sometimes to such an extent that the leaflets clasp the pinna rachis), sessile, truncate at base, 1–2.5(–4) mm long, 1–2.5 mm wide, green, normally glabrous. *Glands* absent from petiole, present on upper margin of rachis 0–6 mm below insertion of each pair of pinnae, rather prominent, often on a short triangular spur, sessile, circular with a thickened rim and distinct pore. *Inflorescences* 1- or 2-headed rudimentary racemes, 1–2(–3) per axil, totalling 1–4 heads per leaf axil; *raceme axis* 0.5–1.5 mm long; *peduncles* 3–7(–8) mm long, glabrous or occasionally sub-glabrous as on branchlets; *heads* globular, pale or bright yellow, 20–25 flowered. *Flowers* 5-merous; *sepals* united to near their apices, calyx tube often dark-coloured at apex. *Pods* linear, 30–60 mm long, 2–4 mm wide, glabrous, dark-coloured with thickened yellowish margins. *Seeds* longitudinal in the pods.

*Selected specimens examined.* WESTERN AUSTRALIA: Middle Road, 400 m N of Kangaroo Road, 22 km NE of Walpole, 13 Aug. 1990, *A.R. Annels* ARA 1158 (PERTH); Granite Peaks camp site, off Mitchell Road, 22 Sept. 1994, *T.D. Macfarlane* & *A.R. Annels* ARA 4465 (PERTH); Granite Peak, N of Walpole, 29 Sept. 1994, *T.D. Macfarlane*, *A.R. Annels* & *R. Hearn* TDM 2234-2 (PERTH); Caldyanup Road, 1.1 km W of the Frankland River crossing, 2 Nov. 1994, *T.D. Macfarlane* TDM 2294 (PERTH); 3.6 km W of Nicol Road/Thomson Road intersection, 40 m N of Nicol Road, 12 Feb. 1997, *C. McChesney* & *C. Day* W 16.1 (PERTH); 3.7 km N of corner of Break Road and Nornalup Road, along Nornalup Road, 20 Aug. 2008, *G. Wardell-Johnson* 16/08 (PERTH); corner of Boronia Road and Middle Road, Kent River, 20 Aug. 2008, *G. Wardell-Johnson* 25/08 (PERTH); c. 20 km N of Bow Bridge, 2 km N of corner of Mountain Road and Boronia Road, 23 Oct. 2008, *G. Wardell-Johnson* 305/08 (PERTH).

*Distribution.* Subspecies *syntoma* has a restricted distribution to the north, east and north-east of Walpole in south-west Western Australia. Its geographic range (approximately 300 km<sup>2</sup>) is bounded by the Deep River in the west, the Kent River in the east, the latitude of Mt Roe in the north, and the South Coast Highway in the south (Figure 1). *Acacia pentadenia* subsp. *pentadenia* occurs in the same area but extends beyond the distribution of subsp. *syntoma* in all directions.

*Habitat.* Subspecies *syntoma* is restricted to sandy/gravelly pale-coloured or yellow duplex soils on low rises, hills and ridges with granitic or sedimentary substrates (Figure 2B, Table 1). This subspecies generally occurs in the 900–1100 mm rainfall zone and is largely restricted to jarrah (*Eucalyptus marginata*)/marri (*Corymbia calophylla*) open forest and woodland. Associated species include *Banksia grandis*, *Hakea florida*, *H. amplexicaulis*, *Taxandria hypericifolia*, *T. parviceps*, *Kingia australis*, *Persoonia longifolia*, *Bossiaea ornata*, *B. linophylla*, *Podocarpus drouynianus* and *Crocea angustifolia*.

Subspecies *pentadenia* (Figure 2A) predominates on hilly terrain on brown gravelly duplex soils over granite or on yellow duplex soils in higher rainfall areas (over 1100 mm). It occurs predominantly in tall forest dominated by karri (*Eucalyptus diversicolor*), red tingle (*E. jacksonii*) and yellow tingle (*E. guilfoylei*), but also occurs on the margins of these forest types where marri dominates. Associated species in these areas include *Leucopogon australis*, *Lepidosperma effusum*, *Hibbertia cuneiformis*, *Pteridium esculentum*, *Acacia urophylla*, *Agonis flexuosa*, *Chorilaena quercifolia* and *Boronia gracilipes*.

The small area north-east of Walpole where the two subspecies occur is climatically, edaphically and topographically complex. In some places, particularly in areas featuring steep environmental gradients, there are sympatric occurrences of the two subspecies. These include a site at Granite Peak, approximately 25 km north of Walpole, the corner of Western and Mitchell Roads, approximately 27 km north-east of Walpole, and Thompson Road between Nicol and Beardmore Roads, approximately 19 km north of Walpole. These areas have steep ecological boundaries with slope and soil type changing rapidly (*T.D. Macfarlane*, pers. comm.). No confirmed hybrids between the two subspecies have been observed or collected at these localities, and all vouchered specimens have been confidently assigned.

*Flowering and fruiting period.* Subspecies *syntoma* commences flowering in mid August and ends in late October. Immature pods have been collected in late October. Mature seed is present on the plants between December and January and is shed by February. Recent field observations in the area north-east of Walpole show that in any one year subsp. *pentadenia* commences flowering 1–2 months later than subsp. *syntoma*.

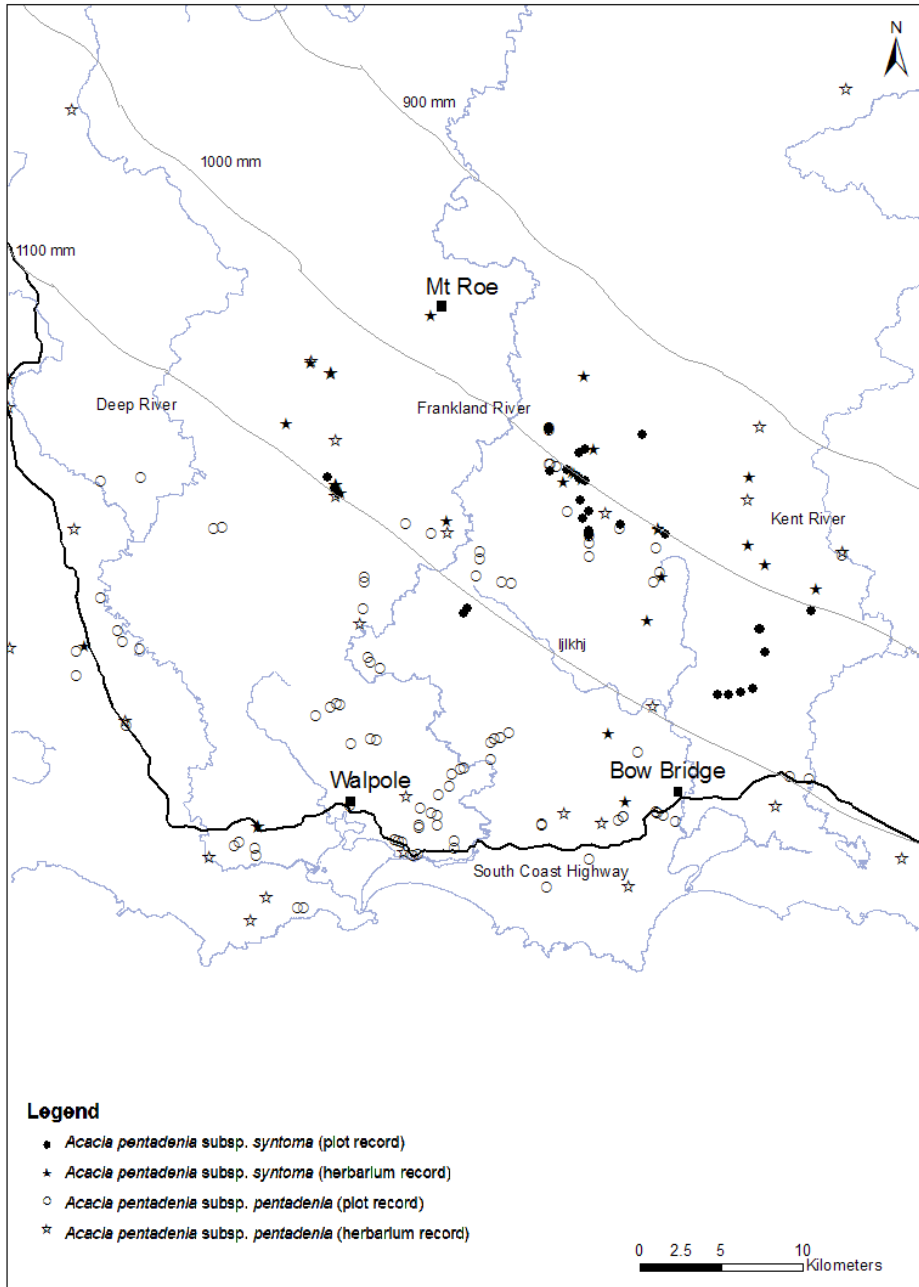


Figure 1. Distribution of *Acacia pentadenia* subsp. *syntoma* and subsp. *pentadenia* (within the study area) in south-west Western Australia. Occurrences of the two subspecies are taken from herbarium records and plot records from the Tingle Mosaic floristic survey (Wardell-Johnson & Williams 2006). A total of 29 quadrats from 283 quadrats located within the study area included subsp. *syntoma*. Subspecies *pentadenia* extends in distribution beyond subsp. *syntoma* in all directions outside the mapped area.

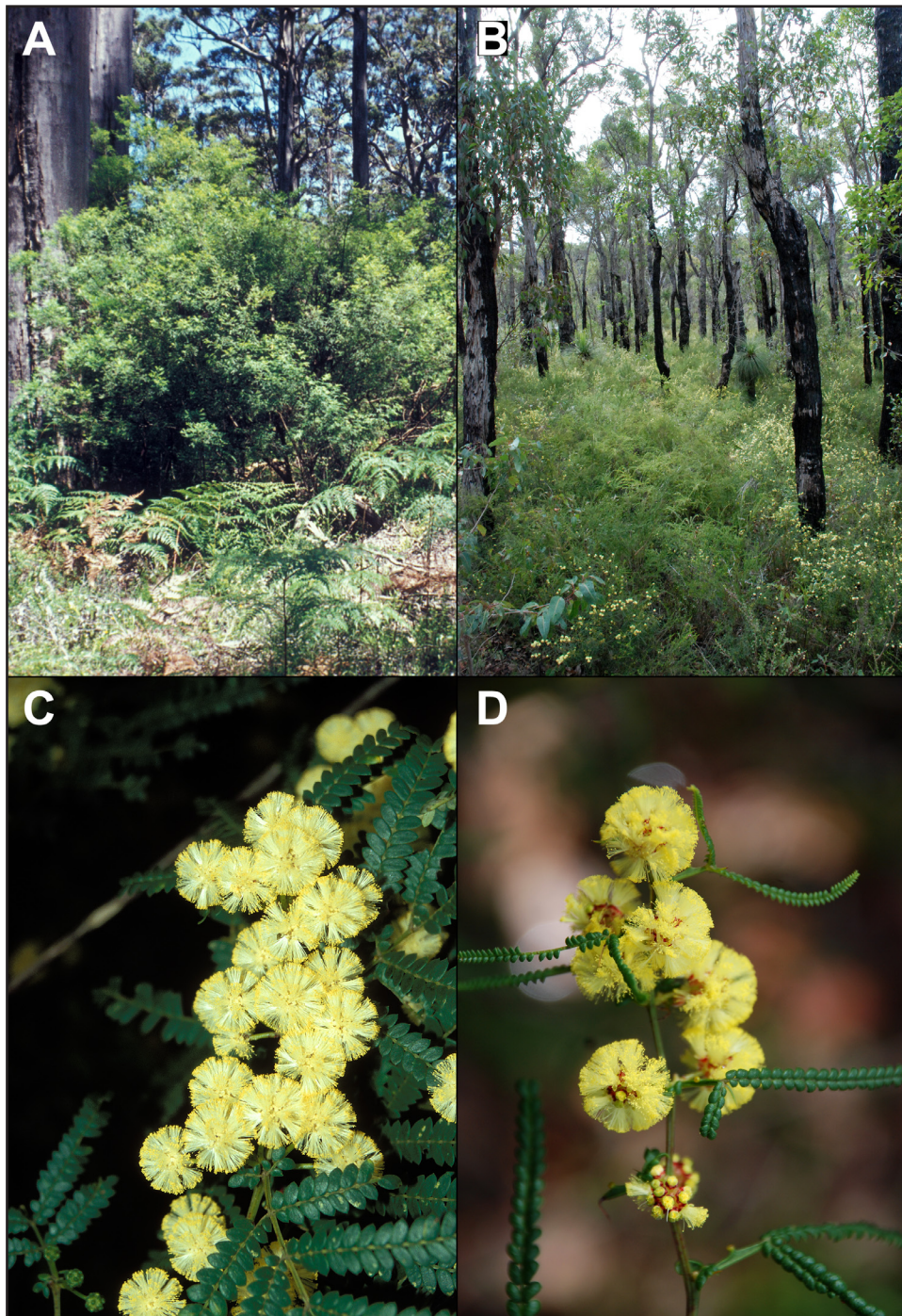


Figure 2. Comparative images of *Acacia pentadenia* subsp. *pentadenia* (A & C) and subsp. *syntoma* (B & D). A – habit and habitat of subsp. *pentadenia* in karri forest; B – habit and habitat of subsp. *syntoma* showing over storey dominance of jarrah/marri open-forest; C – inflorescences and foliage of subsp. *pentadenia*, D – inflorescences and foliage of subsp. *syntoma*. Photographs by B.R. Maslin (A), G. Wardell-Johnson (B & D), and E. McCrum (C).

Table 1. Frequency of occurrence of *Acacia pentadenia* subsp. *syntoma* and subsp. *pentadenia* in quadrats in the floristic survey of the Tingle Mosaic (Wardell-Johnson & Williams 1996) in relation to the soils and landform/soils units of Churchward et al. (1988). The survey included 441 quadrats in an area from Deep River to Two Peoples Bay and inland to Roe Road. A total of 283 quadrats were located in the study area shown in Figure 1.

Habitat		Taxa	
Soils description	Topography (landform/soils units)	<i>A. pentadenia</i> subsp. <i>pentadenia</i> (quadrats)	<i>A. pentadenia</i> subsp. <i>syntoma</i> (quadrats)
Brown gravelly duplex (b) soils on granitic terrain	Hills and ridges > 60 m relief (Keystone)	92 (104)	2 (104)
	Hills and hilly terrain (20–60 m relief – Mattaband) and Low hills and hilly terrain (Collis)	8 (10)	0 (10)
	Major valleys	9 (9)	0 (9)
Gravelly yellow duplex (y) soils on granitic terrain	Hills and ridges > 60 m relief (Keystone)	16 (43)	7 (43)
	Hills and hilly terrain (20–60 m relief – Mattaband) and Low hills and hilly terrain (Collis)	8 (20)	4 (20)
	Margins of swampy areas (Angove, Burnett, Caldyanup, Owingup, Quagering)	8 (50)	1 (50)
Shallow, gritty yellow duplex soils (p), margins of granitic outcrop (g) and podzols (s)	Hills and ridges > 60 m relief (Keystone)	8 (26)	6 (26)
Sands and laterite on crests or sandy gravelly yellow duplex soils on siltstones and sandstones	Ridge crests and undulating sandy terrain (Dempster, Trent, Fernley)	0 (18)	9 (18)

*Conservation status.* Not considered rare or endangered.

*Rank.* In applying rank to this new entity we have adopted the criteria of Cowan and Maslin (1995). Therefore, judging from morphological, phenological and ecological evidence it is deemed appropriate to treat this entity as a subspecies of *A. pentadenia*.

*Common name.* False Karri Wattle.

*Etymology.* The subspecies name is derived from the Greek *syntomos* (abridged, shortened) and refers to the low stature and short leaflets which help distinguish the new subspecies from subsp. *pentadenia*.



Table 2. Main differences distinguishing *Acacia pentadenia* subsp. *pentadenia* from subsp. *syntoma*

Attribute	subsp. <i>pentadenia</i>	subsp. <i>syntoma</i>
<b>Habit</b>	Shrub or tree, 2–5(–9) m tall.	Shrub, 0.5–1.5 m tall
<b>Rachis length</b> (mm)	10–50	7–30
<b>Pinnae</b> (pairs)	2–5 (6–8)	2–3
<b>Leaflets</b>		
Length (mm)	2.5–6	1–2.5(–4)
Posture	Flat, but margins and/or apex sometimes slightly recurved.	Flat or shallowly concave; margins and apex often slightly recurved.
<b>Heads</b>		
Number per raceme	(1–)2–4	1–2
Total number per axil	(3–)4–9	1–4
<b>Peduncle length</b> (mm)	8–20	3–7(–8)
<b>Habitat</b>	Brown, gravelly duplex soils on hilly terrain over granite or on yellow duplex soils in high rainfall areas of the region.	Yellow, sandy/gravelly duplex soils on low rises, hills and ridges with granitic or sedimentary substrates.
	Mostly occurring in tall forest dominated by karri, red tingle and yellow tingle.	Largely restricted to jarrah/marri open forest and woodland.
<b>Flowering time</b>	September – November	August – October

*Affinities.* Subspecies *pentadenia* (Figure 2C) differs most obviously from subspecies *syntoma* (Figure 2D) by its generally more numerous pairs of pinnae (2–5), longer leaflets (2.5–6 mm long), longer peduncles (8–20 mm long) and greater number of heads per leaf axil (occasionally 3, but usually 4–9). There is no single morphological attribute that uniquely separates subsp. *syntoma* from subsp. *pentadenia* as shown in Table 2, however, when used in combination the above attributes enable the two taxa to be generally reliably distinguished (see **Key to subspecies**). Furthermore, in the field the two subspecies can be distinguished by their stature (taller in subsp. *pentadenia*), phenology (see above) and importantly they are separated ecologically as discussed under *Habitat* above and shown in Table 1. Notwithstanding the above differences there are a few specimens that can not be confidently assigned to one subspecies or the other.

For comparative purposes the description of *A. pentadenia* provided by Maslin (2001) applies to subsp. *pentadenia*.

**Key to subspecies**

- Peduncles 3–8 mm long; heads 1–4 per leaf axil; leaflets 1–2.5(–4) mm long; pinnae 2–3 pairs. Shrubs 0.5–1.5 m tall ..... subsp. **syntoma**
- Peduncles more than 8 mm long or if shorter then other characters not combined as above (i.e. heads more numerous or leaflets longer or pinnae more numerous). Shrubs or trees 2–5(–9) m tall ..... subsp. **pentadenia**

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