67 CASUARINACEAE [1]

Dennis I Morris [2]

Monoecious or dioecious evergreen trees or shrubs; branches and branchlets articulate, assimilating branchlets slender, often drooping, deciduous internodes of the branchlets (articles); leaves produced as teeth in whorls of 4–20 at the apex of each article, their decurrent bases forming ridges (phyllichnia), separated by open or closed furrows, fused to and forming a sheath around the article. Flowers anemophilous. Male inflorescences catkin-like spikes, short to elongated, erect or drooping. Male flowers whorled at the nodes, each flower in the axil of a bract (a modified article-tooth), consisting of a single dithecal basifixed anther subtended by two pairs of scale-like bracteoles. Female inflorescences globular or ovoid sessile or on short axillary branches. Female flowers produced in whorls, each subtended by a bract (a modified article-tooth) and by a lateral pair of bracteoles which are at first minute but become greatly enlarged and ± woody in fruit. Female flowers; ovary bilocular, only the anterior loculus fertile, styles 2 united at the base in a common style. Infructescence a woody cone the mass of which is formed by the floral bracteoles enlarged as valves. Fruit a samara. Seed solitary, cotyledons large, endosperm absent.

A family of 4 genera and about 90 species, mainly Australian but extending to the Pacific, south-eastern Asia and Madagascar. 3 genera (*Allocasuarina* endemic) and 66 species (mostly endemic) in Australia. Occasionally used in horticulture. Casuarinaceae are isolated taxonomically in the Fagales but are most closely related to Betulaceae (mainly N Hemisphere) and Ticodendraceae (Central America) (see Steane *et al.* 2003; Stevens 2007; and references cited therein).

Key reference: Wilson & Johnson (1989).

External resources: accepted names with synonymy & distribution in Australia (APC); author & publication abbreviations (IPNI); mapping (AVH, NVA); nomenclature (APNI, IPNI).

1 ALLOCASUARINA

Allocasuarina L.A.S.Johnson, *J. Adelaide Bot. Gard.* 6: 79 (1982).

Evergreen trees or shrubs, monoecious or dioecious; young persistent branches with teeth recurved and longer than those of the deciduous branchlets; article furrows closed. Leaves (teeth) in whorls of 4–14. Male flower-spikes sessile or terminating deciduous branchlets. Male flowers with lateral bracteoles hooded over the anther, cohering at the apex and shed as the anther emerges or free at the apex and persistent, the anterior-posterior pair (tepals?) smaller, deciduous. Fruiting cones with floral bracteoles greatly enlarged and woody, the dorsal area produced into 1 or more (not in Tas.) protuberance. Samaras black or occasionally orange-red, glabrous, shining.

An Australian endemic genus of about 60 species; 7 species in Tasmania, of which 4 are endemic. The genus is classified into 12 sections, 2 of which occur in Tasmania (Wilson & Johnston 1989). *Allocasuarina verticillata* is placed in section *Oöpitys* L.A.S.Johnson (2 spp.) while the remaining species are placed in section *Cylindropitys* L.A.S.Johnson (29 spp.).

1 This work can be cited as: Morris DI (2009) 67 Casuarinaceae, version 2009:1. In MF Duretto (Ed.) *Flora of Tasmania Online*. 5 pp. (Tasmanian Herbarium, Tasmanian Museum & Art Gallery: Hobart). ISBN 978-1-921599-17-0 (PDF). **www.tmag.tas.gov.au/floratasmania**

2 (deceased) formerly Tasmanian Herbarium, Tasmanian Museum & Art Gallery, Private Bag 4, Hobart, Tasmania 7001, Australia.

1.	Phyllichnia verruculose; furrows pubescent; cones cylindrical to almost orbicular	**1 A. verticillata**
1:	Phyllichnia smooth; furrows pubescent or glabrous; cones ovate to cylindrical	2
2.	Phyllichnia flat or slightly rounded with a median groove along their length	**2 A. paludosa**
2:	Phyllichnia rounded or angular, without a median groove	3
3.	Furrows glabrous; plant an erect small tree to 8 m high of conifer-like habit; dioecious (S of Hobart)	**7 A. duncanii**
3:	Furrows glabrous or pubescent; plant a shrub or tree of spreading habit (widespread)	4
4.	Shrub or small tree spreading habit to 10 m high; furrows usually pubescent, sometimes sparingly so	**3 A. littoralis**
4:	Shrub, usually less than 3 m high; furrows pubescent or glabrous	5
5.	Furrows densely to sparingly pubescent; articles 1–2.5 mm diam.; teeth spreading to recurved (Tasman Pen.: Cape Pillar area, Tasman Is.)	**6 A. crassa**
5:	Furrows usually glabrous; articles 0.6–1.5 mm diam.; teeth appressed to spreading (widespread)	6
6.	Plants monoecious or sometimes dioecious; teeth (4)5–10, appressed to slightly spreading; furrows usually glabrous but sometimes sparingly pubescent in basal articles of the branchlet	**4 A. monilifera**
6:	Plants dioecious; teeth 7–9(10), erect to spreading; furrows glabrous	**5 A. zephyrea**

1 Allocasuarina verticillata (Lam.) L.A.S.Johnson, *J. Adelaide Bot. Gard.* 6: 79 (1982) *She Oak*

Casuarina verticillata Lam., *Encycl. (Lamarck)* 2: 501 (1786). *Casuarina stricta* Aiton, *Hort. Kew. (W.T.Aiton)* 3: 320 (1789); *C. exelsa* Salisb., *Prodr. Stirp. Chap. Allerton* 2 (1796), *nom. illeg. Casuarina quadrivalvis* Labill., *Nov. Holl. Pl.* 2: 67, t. 218 (1806). *Casuarina quadrivalvis* var. *macrocarpa* Miq., *Revis. Crit. Casuar.* 73, t. 10B (1848). *Casuarina quadrivalvis* var. *spectabilis* Miq., *Revis. Crit. Casuar.* 73, t. 10C (1848); *C. gunnii* Hook.f. ex Miq., *Ned. Kruidk. Arch.* 44: 100 (1856).

Illustrations: Wilson & Johnson, *Fl. Australia* 3: xv, fig. 17; 101, fig. 45k; 145, fig. 53g-h (1989); Entwisle, *Fl. Victoria* 3: 94, fig. 19f-g (1996); Wilson & Johnson, *Fl. New South Wales* 1, rev. edn: 514 (2000); Harris *et al.*, *One Hundred Islands: the Flora of the Outer Furneaux* 103 (2001); Gilfedder *et al.*, *The Nature of the Midlands* 104 (2003); Whiting *et al.*, *Tasmania's Natural Flora* 92 (2004).

Shrub or small tree 3–9 m high. Branchlets drooping, to 45 cm long; articles 8–40 mm long, 0.6–1.2 mm diam., furrows pubescent; phyllichnia rounded, verruculose; teeth 9–11, 1–2 mm long, half-spreading. Male spikes 1.25–8 mm long, 2.5–3.5 whorls per cm; anthers c. 1.5 mm long. Cones cylindrical to almost orbicular, 3–4.5 cm long, 2.5–3 cm diam., on peduncles to 7 mm long; cone bracteoles produced into a short straight or curved mucro, protuberances much smaller than the body of the bracteoles and inconspicuous. Samaras 8–12 mm long. Flowering & fruiting throughout year.

Tas. (FLI, TNM, TSE); also SA, NSW, Vic. Found in open woodland, shrubberies, dune hollows, coastal cliffs, scattered trees in farmland, from sea level to 500 m altitude. Taxonomically isolated in Tasmania with its closest relative being *A. huegeliana* (Miq.) L.A.S.Johnson (SW WA).

2 Allocasuarina paludosa (Sieber ex Spreng.) L.A.S.Johnson, *J. Adelaide Bot. Gard.* 6: 77 (1982)
Scrub She Oak

Casuarina paludosa Sieber ex Spreng., *Syst. Veg. (ed. 16) [Sprengel]* 3: 803 (1826); *C. distyla* var. *paludosa* (Sieber ex Spreng.) Benth., *Fl. Austral.* 6: 199 (1873). *Casuarina pumila* Otto & A.Dietr., *Allg. Gartenzeitung (Otto & Dietrich)* 9: 162 (1841). *Casuarina pumila* var. *hirtella* F.Muell. ex Miq., *Ned. Kruidk. Arch.* 4: 100 (1856). *Casuarina distyla* var. *prostrata* Maiden & Betche, *Proc. Linn. Soc. New South Wales* 30: 371 (1905). *Casuarina bicuspidata sensu* L.Rodway, *Tasman. Fl.* 181 (1903), *non* Benth. (1873).

Illustrations: Wilson & Johnson, *Fl. Australia* 3: 101, fig. 45d; 167, fig. 59c-d (1989); Entwisle, *Fl. Victoria* 3: 94, fig. 20f-g (1996); Corrick & Fuhrer, *Wildflowers of Victoria* 53, fig. 189 (2000); Wilson & Johnson, *Fl. New South Wales* 1, rev. edn: 514 (2000); Whiting *et al.*, *Tasmania's Natural Flora* 91 (2004).

Dioecious shrub to 1.5(–3 outside Tas.) m high. Branchlets erect or spreading, 6--13 cm long; articles to 12 mm long, 0.4–1 mm diam., furrows sometimes minutely pubescent; phyllichnia flat or slightly rounded, with a median groove along their length; teeth 6–10, slightly appressed to slightly spreading, 0.4–0.5 mm long. Male spikes 1.0–2.5 cm long, 7–9 whorls per cm; bracteoles persistent; anthers 0.6–0.8 mm long. Cones ± cylindrical 10–18 mm long, 7–13 mm diam., ± sessile or on peduncles to 2.5 mm long, often clustered in whorls, bracteoles obtuse, lateral protuberances pyramidal-triangular, shorter than the bracteoles. Samaras 3–4 mm long, shining. Flowering & fruiting mostly Jul.-Feb.

Tas. (FLI); also SA, NSW, Vic. Found on Flinders Island and on the island of Tasmania in the north-east. Occurs in coastal shrubberies, heaths, dunes, from sea level to c. 150 m alt. Tasmanian plants all appear to be dioecious and do not reach the height recorded for Australian mainland plants, the phyllichnia teeth also are smaller and the grooves never as obviously pubescent as in plants from some areas on the mainland.

3 Allocasuarina littoralis (Salisb.) L.A.S.Johnson, *J. Adelaide Bot. Gard.* 6: 76 (1982) *Black She Oak, Bull Oak*

Casuarina littoralis Salisb., *Prodr. Stirp. Chap. Allerton* 2 (1796). *Casuarina suberosa* Otto & Dietr., *Allg. Gartenzeitung (Otto & Dietrich)* 9: 155 (1841). *Casuarina leptoclada* Miq., *Revis. Crit. Casuar.* 41, t. 4C (1848). *Casuarina moesta* F.Muell. ex Miq., *Ned. Kruidk. Arch.* 44: 98 (1856).

Illustrations: Wilson & Johnson, *Fl. Australia* 3: xv, fig. 20; 149, fig. 54c (1989); Entwisle, *Fl. Victoria* 3: 94, fig. 20h-i (1996); Wilson & Johnson, *Fl. New South Wales* 1, rev. edn: 515 (2000); Harris *et al.*, *One Hundred Islands: the Flora of the Outer Furneaux* 103 (2001); Gilfedder *et al.*, *The Nature of the Midlands* 104 (2003); Whiting *et al.*, *Tasmania's Natural Flora* 90 (2004).

Dioecious or monoecious shrub or small tree to 10 m high. Branchlets 3–20 cm long, erect or drooping; articles 3–10 mm long, 0.4–1 mm diam., furrows usually pubescent, at least in the basal articles of the branchlet; phyllichnia angled or rounded, teeth 6–8, 0.3–0.9 mm long, appressed to slightly spreading. Male spikes 9–30 mm long, 6–12.5 whorls per cm; bracteoles persistent; anthers 0.4–0.8 mm long. Cones cylindrical, 10–38 mm long, 8–18 mm diam., on peduncles 3–12 mm long; bracteoles obtuse, protuberances triangular-pyramidal, shorter than the bracteole body. Samara 5–7 mm long, blackish. Flowering & fruiting throughout year.

Tas. (BEL, FLI, TNM, TNS, TSE); also Qld, NSW, Vic. Found in the eastern half of the state in Eucalypt woodland, heaths, coastal scrubs, from near sea level to c. 550 m alt.

4 Allocasuarina monilifera (L.A.S.Johnson) L.A.S.Johnson, *J. Adelaide Bot. Gard.* 6: 76 (1982)

Casuarina monilifera L.A.S.Johnson in W.M.Curtis, *The Student's Flora of Tasmania* 3: 651 (1967). *Casuarina distyla sensu* J.D.Hooker, *Bot. Antarct. Voy. III. (Fl. Tasman.)* 2: 348 (1855); G.Bentham, *Fl. Austral.* 6: 198 (1863); L.Rodway, *Tasman. Fl.* 181 (1903), *non* Vent. (1802). *Casuarina distyla* var. *rigida sensu* J.D.Hooker, *Bot. Antarct. Voy. III. (Fl. Tasman.)* 2: 348 (1860), p.p., *non* (Miq.) Hook.f. (1855), see L.A.S.Johnson in W.M.Curtis, *The Student's Flora of Tasmania* 3: 653 (1967). *Casuarina* sp. 4 *sensu* B.A.Barlow, *Austral. J. Bot.* 7(3): 238–251 (1959).

Illustrations: Wilson & Johnson, *Fl. Australia* 3: 160, fig. 57d-e (1989); Cameron, *A Guide to Flowers and Plants of Tasmania,* 3rd edn, 109, pl's 73-74 (2000); Harris *et al.*, *One Hundred Islands: the Flora of the Outer Furneaux* 103 (2001); Whiting *et al.*, *Tasmania's Natural Flora* 91 (2004); Simmons *et al.*, *A Guide to Flowers and Plants of Tasmania,* 4th edn, 143 (2008).

Monoecious or dioecious shrub 1–3(–5?) m high. Branchlets 5–18 cm long, erect or drooping; articles 3.5–9 mm long, 0.6–1.2 mm diam.; phyllichnia rounded to bluntly angular; furrows usually glabrous but occasionally sparingly tomentose in the basal articles of the branchlets; teeth (4–)5–10, appressed to slightly spreading, 0.4–1 mm long. Male spikes 1–4.5 cm long, 4–8 whorls per cm, anthers 0.7–1.2 mm diam., on peduncles 2–10 mm long; bracteoles obtuse to broadly acute, protuberances shorter than the body of the bracteoles, triangular-pyramidal, the angles prominent on drying. Cones ellipsoid to cylindrical, 1–3.5(–4) cm long, apex truncate or acute, valves with margins rounded or sometimes bluntly pointed. Samaras 3.5–7 mm long, black or occasionally bright orange. Flowering & fruiting throughout year.

Tas. (all regions except MIS), endemic. Widespread and found in coastal shrubberies, heath and sedgeland, cliffs, open forest, from near sea level to 1100 m alt.

5 Allocasuarina zephyrea L.A.S.Johnson, *Fl. Australia* 3: 199 (1989)

Illustrations: Wilson & Johnson, *Fl. Australia* 3: 160, fig. 57a-c (1989); Whiting *et al.*, *Tasmania's Natural Flora* 92 (2004).

Dioecious shrub to 2 m high. Branchlets erect or drooping. 5–23 cm long, articles 4–15 mm long, 0.6–1.5 mm diam., phyllichnia angular, teeth 7–9(–10), 0.4–1.4 mm long, erect to spreading. Male spikes 1–4.2 cm long, 5–7 whorls per cm, anthers 0.7–1 mm long. Cones 1–3 mm long, 0.6–1.4 cm diam., on pedicles 2–15 mm long. Samara 3–5.5 mm long. Flowering & fruiting throughout year.

Tas. (KIN, TCH, TSR, TWE), endemic. Found in the western areas of the island of Tasmania and King Island in coastal heath, shrubberies, sedgeland, rocky ridges, near sea level to c. 900 m altitude. Similar to *A. monilifera* and in many cases, especially in the specimens from western areas, can be difficult to distinguish from that species. *Allocasuarina zephyrea* appears always to be dioecious whereas *A. monilifera* is usually monoecious though it can also be dioecious. *Allocasuarina zephyrea* is diploid, 2n = 22, *A. monilifera* tetraploid, 2n = 44.

6 Allocasuarina crassa L.A.S.Johnson, *Fl. Australia* 3: 194 (1989)

Illustrations: Wilson & Johnson, *Fl. Australia* 3: 160, fig. 57f (1989); Whiting *et al.*, *Tasmania's Natural Flora* 89 (2004).

Dioecious or monoecious shrub, 1–2(–4) m high. Branchlets spreading to ascending and often tightly clustered, 8–17 cm long, articles 8–20 mm long, 1–2.5 mm diam., smooth, furrows densely to sparsely pubescent, phyllichnia rounded to bluntly angular, teeth 7–10, spreading to recurved 1–3 mm long. Male spikes 1–3.6 cm long, 3.5–4 whorls per cm, anthers 0.8–1.3 mm long. Cones cylindrical, 1.5–3.5 cm long, 1.2–2 cm diam., on peduncles to 3(–8) mm long, bracteoles obtuse to truncate, protuberances triangular-pyramidal, shorter than the bracteole body. Samara 5–8 mm long, black. Flowering mainly Apr.-Oct.; fruiting mainly Apr.-Dec.

Tas. (TSE), endemic. Restricted to Cape Pillar area and Tasman Island at altitudes of 150–350 m. Found on cliff tops, wind-pruned shrubberies and heaths.

7 Allocasuarina duncanii L.A.S.Johnson & D.I.Morris, *Telopea* 5(4): 793, fig. 1 (1994)

Illustration: Whiting *et al.*, *Tasmania's Natural Flora* 90 (2004).

Dioecious small tree to 8 m high, erect and conifer-like in habit. Branchlets stiffly ascending, to 20 cm long; articles 4–17 mm long, 0.9–1.4 mm diam., smooth, furrows glabrous; phyllichnia flat, rounded or bluntly angled, teeth 7–9, appressed to slightly spreading, 0.8–1.5 mm long. Male spikes 7.5–13 mm long, 6–8 whorls per cm,

early deciduous, anthers c. 1 mm long. Cones cylindrical 1.5–6 cm long, 1.2–2.5 cm diam., on peduncles 4–10 mm long, bracteoles obtuse, protuberances slightly shorter than the bracteole body. Samaras 6–10 mm long, dark brown to black. Flowering mainly Jan.-Apr?; fruiting mainly Jan,-Aug.

Tas. (TSE, TSR), endemic. Found in a few restricted areas south of Hobart, usually in dry *Eucalyptus* forest with shrubby undergrowth at an altitude of to 600 m.

REFERENCES

APC (Australian Plant Census) http://www.chah.gov.au/apc/about-APC.html

APNI (Australian Plant Name Index) http://www.anbg.gov.au/cgi-bin/apni

AVH (Australia's Virtual Herbarium) (Council of Heads of Australasian Herbaria) http://www.anbg.gov.au/avh.html

IPNI (International Plant Name Index) http://www.ipni.org/index.html or http://www.us.ipni.org/index.html

NVA (Natural Values Atlas) (Department of Primary Industries and Water: Hobart) http://www.dpiw.tas.gov.au/inter.nsf/WebPages/LJEM-6TV6TV?open

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