

**Supplementary Material**

**The ecology, evolution and management of mast reproduction in Australian plants**

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**Supplementary Table S1.** Observational records of seeding and fruiting intermittency in rainforest tree species from the Wet Tropics, north Queensland, Australia (observations by S. Shaw).

Species	Family	Inter-mast interval	Dispersal mode
<i>Ackama paniculosa</i>	Cunoniaceae	difficult to tell a mast yr	non-zoochorus
<i>Acmena hemilamprum</i>	Myrtaceae	<5 2 to 3 yrs	endozoochorus
<i>Acmena ingens</i>	Myrtaceae	<5	endozoochorus
<i>Ailanthus triphysa</i>	Simaroubaceae	<5 yes masting but not clear of pattern	non-zoochorus
<i>Araucaria bidwillii</i>	Araucariaceae	<5 every 3 yr I thought	endozoochorus
<i>Argyrodendron trifoliatum</i>	Malvaceae	<5 every 2 to 3	Unknown
<i>Argyrodendron actinophyllum</i>	Malvaceae	yes masting but not clear of pattern	non-zoochorus
<i>Argyrodendron sp kin kin</i>	Malvaceae	Unknown	non-zoochorus
<i>Beilschmiedia elliptica</i>	Lauraceae	>5 very strong masting	endozoochorus
<i>Beilschmiedia obtusifolia</i>	Lauraceae	>5 very strong masting	endozoochorus
<i>Canarium australasicum</i>	Burseraceae	yes masting but not clear of pattern	endozoochorus
<i>Castanopora alphanthii</i>	Sapindaceae	<5 1 to 3 mostly	Unknown
<i>Cinnamomum oliverii</i>	Lauraceae	<5	Unknown
<i>Citrus australis</i>	Rutaceae	Unknown	endozoochorus
<i>Cryptocarya glaucenscens</i>	Lauraceae	<5 less than 3	Unknown
<i>Cryptocarya macdonaldii</i>	Lauraceae	Unknown	endozoochorus
<i>Cryptocarya microneura</i>	Lauraceae	<5 about 3 often aborts crop	endozoochorus
<i>Cyrtocarya trip pubens</i>	Lauraceae	<5 less than 3	Unknown
<i>Diospiris pentamera</i>	Ebenaceae	< 3 less than 3	Unknown
<i>Dysoxylum mollissimum</i>	Meliaceae	<5 erratic sometimes 2 yrs in a row	endozoochorus
<i>Dysoxylum sp deep water,</i>	Meliaceae	Unknown	Unknown
<i>Eleocharpus kirtonii</i>	Eleocarpaceae	not enough info, some every year some not	Unknown
<i>Eleocharpus obovatus</i>	Eleocarpaceae	mostly every year occationly a year off	Unknown
<i>Endiandra globosa</i>	Lauraceae	difficult? 2 to 5	Unknown
<i>Endiandra muelleri</i>	Lauraceae	>5 3 to 6	Unknown
<i>Endiandra pubens</i>	Lauraceae	>5 3 to 6	Unknown
<i>Endiandra virens</i>	Lauraceae	<5 1 to 3	Unknown
<i>Euroschinus falcata</i>	Anacardiaceae	<5 about 3, some 2 out 3 yrs	endozoochorus
<i>Flindersia australe</i>	Rutaceae	<5 not masting weather dependent	Unknown
<i>Flindersia bennetiana</i>	Rutaceae	not masting	Unknown
<i>Flindersia schottiana</i>	Rutaceae	<5 not masting weather dependant	Unknown
<i>Flindersia xanthoxyla</i>	Rutaceae	not masting	Unknown
<i>Galbulimima baccata</i>	Himantandraceae	Unknown	endozoochorus
<i>Gmelina leichhardtii</i>	Lamiaceae	<5 every 2 or 3	endozoochorus
<i>Gossia acmenoides</i>	Myrtaceae	>5	endozoochorus
<i>Gossia bidwillii</i>	Myrtaceae	erratic 2 years in a row then none	endozoochorus
<i>Gossia fragrantissima</i>	Myrtaceae	seems to be every year	Unknown
<i>Gossia hillii</i>	Myrtaceae	<3	endozoochorus
<i>Gossia inophloia</i>	Myrtaceae	Unknown	endozoochorus
<i>Gossia punctata</i>	Myrtaceae	yes masting but not clear of pattern	endozoochorus
<i>Litsea australis</i>	Lauraceae	<3	Unknown
<i>Litsea reticulata</i>	Lauraceae	>5	endozoochorus
<i>Neolitsea sp</i>	Lauraceae	regular	Unknown
<i>Niemeyera whitei</i>	Sapotaceae	<5	Unknown
<i>Olea paniculata</i>	Oleaceae	<5 also aborts regularly	endozoochorus
<i>Owenia cepidora</i>	Meliaceae	<5 2 to 3 yrs	Unknown
<i>Planchonella australe</i>	Sapotaceae	<5 strong masting 2 to 3 yrs	Unknown
<i>Pleioluma queenslandica</i>	Sapotaceae	yes masting but not clear of pattern	endozoochorus
<i>Podocarpus elatus</i>	Podocarpaceae	<5 not really masting	Unknown
<i>Pseudoweinmannia lachnocarpa</i>	Cunoniaceae	<5 masting but not clear of pattern	non-zoochorus
<i>Sloanea australis</i>	Eleocarpaceae	<5 don't think they mast	endozoochorus
<i>Sloanea woollsii</i>	Eleocarpaceae	<5 don't think they mast	endozoochorus
<i>Syzygium corynanthum</i>	Myrtaceae	<5 1 to 3 mostly	endozoochorus
<i>Syzygium crebrinerve</i>	Myrtaceae	<5 1 to 3 mostly	endozoochorus, non-zoochorus
<i>Syzygium francisii</i>	Myrtaceae	<5 2 to 5 yrs heavy masting	endozoochorus, non-zoochorus
<i>Waterhousea floribunda</i>	Myrtaceae	<5 2 to 3 years	Unknown

**Supplementary Table S2.** Records of inter-year variation in reproductive activity by eucalypts. Generic names are current at the time of publication. Some *Corymbia* were listed as *Eucalyptus* in the source publication. Species names are current at the time of publication. Where this differs from that in the source publication, the source name is provided in brackets after the current name. Records are entered at the species level, with multiple records for multi-species studies. Where a study provides data from which the CV was calculable for more than one site for a species, each site is given a separate record. Records based on capsule or seed fall are included only if it is clear from the source that there was very little or no carryover from one flowering event to the next. CVp = population coefficient of variation, calculated by us. n.a. = CV not available; either raw data not presented, or data is rank order or qualitative.

Species	Environment	Parameter	N years	Spatial scale	Source	inter-annual CVp	Notes
<i>Angophora costata</i> (Gaertn.) Britten	sub-tropical open forest	presence of flowering	10	4 sites	Law <i>et al.</i> (2000)	n.a.	3.3 (2–7) flowerings in 10 years (large trees)
<i>Angophora floribunda</i> (Sm.) Sweet	sub-tropical open forest	presence of flowering	10	4 sites	Law <i>et al.</i> (2000)	n.a.	2.7 (1–6) flowerings in 10 years (large trees)
<i>Corymbia citriodora</i> (Hook.) K.D.Hill & L.A.S.Johnson ( <i>variegata</i> )	sub-tropical open forest	presence of flowering	10	5 sites	Law <i>et al.</i> (2000)	n.a.	4.4 (2–7) flowerings in 10 years (large trees)
<i>Corymbia citriodora</i> (Hook.) K.D.Hill & L.A.S.Johnson ( <i>variegata</i> )	sub-tropical open forest	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every 3-5 years
<i>Corymbia clarksoniana</i> (D.J.Carr & S.G.M.Carr) K.D.Hill & L.A.S.Johnson	tropical woodland	% trees flowering	2	site	Jackson (2001)	n.a.	n=79: 27% of trees didn't flower, 67% flowered once, 6% flowered twice
<i>Corymbia gummifera</i> (Gaertn.) K.D.Hill & L.A.S.Johnson	sub-tropical open forest	presence of flowering	10	6 sites	Law <i>et al.</i> (2000)	n.a.	2.7 (0–4) flowerings in 10 years (large trees)
<i>Corymbia intermedia</i> (R.T.Baker) K.D.Hill & L.A.S.Johnson	sub-tropical open forest	index of nectar production	2	region	Hawkins <i>et al.</i> (2018)	n.a.	c. 1.5-fold variation between years
<i>Corymbia intermedia</i> (R.T.Baker) K.D.Hill & L.A.S.Johnson	tropical woodland	% trees flowering	2	site	Jackson (2001)	n.a.	n=5: no trees didn't flower, 20% flowered once, 80% flowered twice; among-year synchrony not reported
<i>Corymbia maculata</i> (Hook.) K.D.Hill & L.A.S.Johnson	temperate open forest	opercula fall	15	site	Pook <i>et al.</i> (1997)	2.52	bud initiation occurred 7 times, with 4 minor and 3 major flowerings
<i>Corymbia maculata</i> (Hook.) K.D.Hill & L.A.S.Johnson	temperate open forest	flower abundance	4	forest	Goldingay (1990)	n.a.	flowering sequence of years - nil, nil, weak, strong (latter c. 100-fold greater than "weak")
<i>Corymbia maculata</i> (Hook.) K.D.Hill & L.A.S.Johnson	temperate/sub-tropical open forest	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every four years
<i>Corymbia polycarpa</i> (F.Muell.) K.D.Hill & L.A.S.Johnson	tropical savanna	flower abundance index	4	38 plots across large mine site	Brady (2009)	n.a.	peak flowering index varied between years $\infty$ -fold, i.e. no flowering in one year
<i>Corymbia polysciada</i> (F.Muell.) K.D.Hill & L.A.S.Johnson	tropical savanna	% trees in fruit	3	site	Williams <i>et al.</i> (1999)	0.38	some flowering each year
<i>Corymbia porrecta</i> (S.T.Blake) K.D.Hill & L.A.S.Johnson	tropical savanna	% trees in bud	3	site	Williams <i>et al.</i> (1999)	0.13	some flowering each year

<i>Corymbia tessellaris</i> (F.Muell.) K.D.Hill & L.A.S.Johnson	tropical woodland	% trees flowering	2	site	Jackson (2001)	n.a.	n=14; 36% of trees didn't flower, 50% flowered once, 14% flowered twice; among-year synchrony not reported
<i>Corymbia trachyphloia</i> (F.Muell.) K.D.Hill & L.A.S.Johnson	temperate woodland	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every two years
<i>Eucalyptus acmenoides</i> Schauer in W.G.Walpers	sub-tropical open forest	presence of flowering	10	3 sites	Law <i>et al.</i> (2000)	n.a.	5.0 (4–6) flowerings in 10 years (large trees)
<i>Eucalyptus acmenoides</i> Schauer in W.G.Walpers	sub-tropical open forest	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every 1-3 years
<i>Eucalyptus albens</i> Benth.	temperate woodland	opercula fall	3	site	Semple <i>et al.</i> (2007)	c. 0.90	CV estimated from graphical data
<i>Eucalyptus arenacea</i> Marginson & P. Ladiges	temperate open forest	flower and capsule abundance	4	4 sites across region	Koch (2005)	n.a.	fructed first and last year of four; highly synchronised within and between sites
<i>Eucalyptus bancroftii</i> (Maiden) Maiden	sub-tropical open forest	presence of flowering	10	site	Law <i>et al.</i> (2000)	n.a.	4 flowerings in 10 years (large trees)
<i>Eucalyptus baxteri</i> (Benth.) Maiden & Blakely ex J.Black	temperate open forest	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 3-4 years
<i>Eucalyptus baxteri</i> (Benth.) Maiden & Blakely ex J.Black	temperate open forest	flower and capsule abundance	7	3 sites across region	Koch (2005)	n.a.	fructed in 3 of 7 years; highly synchronised within and between sites
<i>Eucalyptus camaldulensis</i> Dehnh.	riparian	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 2-5 years
<i>Eucalyptus camaldulensis</i> Dehnh.	riparian	ranked flower abundance	3	region	Jensen <i>et al.</i> (2007)	n.a.	flowered in all three years though most individuals flowered only every second year
<i>Eucalyptus camaldulensis</i> Dehnh.	semi-arid floodplain woodland	qualitative flowering intensity	40	forest	Keatley <i>et al.</i> (2021)	n.a.	flowered almost every year but more intensely every second year
<i>Eucalyptus camaldulensis</i> Dehnh.	riparian	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every 2-4 years
<i>Eucalyptus camphora</i> R.T.Baker	temperate floodplain forest	opercula fall	5	site	J. Greet, unpublished data	0.72	1 of 3 sites; flowered all years, with 9-fold variation among years
<i>Eucalyptus camphora</i> R.T.Baker	temperate floodplain forest	opercula fall	5	site	J. Greet, unpublished data	1.01	1 of 3 sites; flowered all years, with 22-fold variation among years
<i>Eucalyptus camphora</i> R.T.Baker	temperate floodplain forest	opercula fall	5	site	J. Greet, unpublished data	1.15	1 of 3 sites; flowered all years, with 20-fold variation among years
<i>Eucalyptus crebra</i> F.Muell.	sub-tropical woodland	capsule fall	2	site	Burrows and Burrows (1992)	0.22	1 of 2 sites; 1.4-fold variation between years
<i>Eucalyptus crebra</i> F.Muell.	sub-tropical woodland	capsule fall	3	site	Burrows and Burrows (1992)	0.88	1 of 2 sites; 114-fold variation between years
<i>Eucalyptus crebra</i> F.Muell.	temperate/sub-tropical open forest and woodland	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every 2-3 years
<i>Eucalyptus cypellocarpa</i> L.A.S.Johnson	temperate open forest	opercula fall	3	site	Murray and Lutze (2004)	1.22	flowered each year with 9-fold variation
<i>Eucalyptus cypellocarpa</i>	temperate open forest	flower	3	catchment	Kavanagh (1987)	n.a.	small % of trees flowered each year

<i>L.A.S.Johnson</i>		abundance, % trees in flower					
<i>Eucalyptus delegatensis</i> R.T.Baker	temperate open forest	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every two years
<i>Eucalyptus delegatensis</i> R.T.Baker	temperate open forest	opercula fall	5	?state	Fagg <i>et al.</i> (2013)	n.a.	heavy flowering in 2 of 5 years; heaviest was $\infty$ -fold greater than lightest
<i>Eucalyptus delegatensis</i> R.T.Baker	temperate open forest	flowering	?	site	Ferguson (2011) from Flint & Fagg (2007)	n.a.	probability of good flowering follow previous good flowering is low until 0.7 in fifth year
<i>Eucalyptus delegatensis</i> R.T.Baker	sub-alpine open forest	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every two years
<i>Eucalyptus denticulata</i> I.O.Cook & Ladiges	temperate open forest	opercula fall	4	site	Murray <i>et al.</i> (2004)	0.34	flowered each year with 2.1-fold variation
<i>Eucalyptus diversicolor</i> F.Muell.	temperate open forest	opercula fall	11	valley	Loneragan (1979)	1.49	some flowering in 10 of 11 years, 661-fold variation among flowering years
<i>Eucalyptus diversicolor</i> F.Muell.	temperate open forest	flowering observations	42	district	Loneragan (1979)	n.a.	flowering (main?) occurred in 22 years, heavy flowering in 8 years; seeding (excluding 'rare or none') occurred in 31 years
<i>Eucalyptus dives</i> Schauer in W.G.Walpers	temperate open forest	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every four years
<i>Eucalyptus dumosa</i> A.Cunn. ex J.Oxley	mallee	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every four years
<i>Eucalyptus fastigata</i> H.Deane & Maiden	temperate open forest	opercula fall	5	site	Murray <i>et al.</i> (2004)	1.78	flowered each year with 85-fold variation
<i>Eucalyptus fastigata</i> H.Deane & Maiden	temperate open forest	flower abundance, % trees in flower	4	catchment	Kavanagh (1987)	n.a.	flowered in two of four years only
<i>Eucalyptus globoidea</i> Blakely	temperate open forest	opercula fall	4	site	Bassett (2002)	1.16	some flowering each year with 14-fold variation among years
<i>Eucalyptus globulus</i> Labill. ( <i>bicostata</i> )	temperate open forest	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 2-6 years
<i>Eucalyptus goniocalyx</i> F.Muell. ex Miq.	temperate open forest	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 4-5 years
<i>Eucalyptus gracilis</i> F.Muell.	mallee	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 1-5 years
<i>Eucalyptus grandis</i> W.Hill in Anonymous (1862)	sub-tropical open forest	index of nectar production	2	region	Hawkins <i>et al.</i> (2018)	n.a.	>10-fold variation between years
<i>Eucalyptus grandis</i> W.Hill in Anonymous (1862)	sub-tropical open forest	presence of flowering	10	3 sites	Law <i>et al.</i> (2000)	n.a.	7.0 (6–8) flowerings in 10 years (large trees)
<i>Eucalyptus incrassata</i> Labill.	mallee	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 1-4 years
<i>Eucalyptus largiflorens</i> F.Muell.	semi-arid floodplain woodland	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 1-2 years
<i>Eucalyptus largiflorens</i> F.Muell.	riparian	ranked flower abundance	3	region	Jensen <i>et al.</i> (2007)	n.a.	flowered in all three years, with most individuals flowering every year

<i>Eucalyptus largiflorens</i> F.Muell.	semi-arid floodplain woodland	flowering intensity	40	forest	Keatley <i>et al.</i> (2021)	n.a.	flowered almost every year with no autocorrelation in intensity
<i>Eucalyptus largiflorens</i> F.Muell.	semi-arid floodplain woodland	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every two years
<i>Eucalyptus leptophylla</i> F.Muell. ex Miq. ( <i>foecunda</i> )	mallee	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: annual
<i>Eucalyptus leucoxydon</i> F.Muell.	temperate woodland	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 1-3 years
<i>Eucalyptus leucoxydon</i> F.Muell.	temperate woodland	ranked flower abundance	26, 32	2 forests	Keatley and Hudson (2007)	n.a.	some flowering every year in both forests; concordant between forests
<i>Eucalyptus macrorhyncha</i> F.Muell. ex Benth.	temperate open forest	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 3-7 years
<i>Eucalyptus macrorhyncha</i> F.Muell. ex Benth.	temperate open forest	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every 3-4 years
<i>Eucalyptus marginata</i> D. Don ex Sm.	regenerating temperate open forest	opercula fall	3	site	Whitford <i>et al.</i> (2004)	1.63	total for various experimental plots; flowering occurred in all three years, varying 114-fold
<i>Eucalyptus mediocris</i> L.A.S.Johnson & K.D.Hill	tropical open forest	qualitative major flowering	?	district	Franklin <i>et al.</i> (2016)	n.a.	mass-flowering about once in ten years
<i>Eucalyptus melanophloia</i> F.Muell.	sub-tropical woodland	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every 3-5 years
<i>Eucalyptus melliodora</i> A.Cunn. ex Schauer in W.G.Walpers	temperate woodland	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 2-3 years
<i>Eucalyptus melliodora</i> A.Cunn. ex Schauer in W.G.Walpers	temperate woodland	ranked flower abundance	26, 32	2 forests	Keatley and Hudson (2007)	n.a.	some flowering in 86 & 97% of years; discordant between forests
<i>Eucalyptus microcarpa</i> (Maiden) Maiden	temperate woodland	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 2-3 years
<i>Eucalyptus microcarpa</i> (Maiden) Maiden	temperate woodland	ranked flower abundance	26, 32	2 forests	Keatley and Hudson (2007)	n.a.	some flowering in 79 & 84% of years; concordant between forests
<i>Eucalyptus microcorys</i> F.Muell.	sub-tropical open forest	presence of flowering	10	7 sites	Law <i>et al.</i> (2000)	n.a.	7.0 (6–8) flowerings in 10 years (large trees)
<i>Eucalyptus miniata</i> A.Cunn. ex Schauer in W.G. Walpers	tropical savanna	% trees in fruit	3	site	Williams <i>et al.</i> (1999)	0.14	some flowering each year
<i>Eucalyptus miniata</i> A.Cunn. ex Schauer in W.G. Walpers	tropical savanna	% trees reproductive	3	2 sites	Setterfield and Williams (1996)	0.33	some flowering each year
<i>Eucalyptus miniata</i> A.Cunn. ex Schauer in W.G. Walpers	tropical savanna	flower abundance index	2	36 plots across large mine site	Brady (2009)	n.a.	peak flowering index varied between years 5.7-fold
<i>Eucalyptus moluccana</i> Roxb.	sub-tropical woodland	capsule fall	3	site	Burrows and Burrows (1992)	0.32	1 of 2 sites; 1.7-fold variation among three years
<i>Eucalyptus muelleriana</i> A.W.Howitt	temperate open forest	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every 3-5 years
<i>Eucalyptus obliqua</i> L'Héritier	temperate open forest	opercula fall	4	site	Murray and Lutz (2004)	0.96	flowered each year with 62-fold variation
<i>Eucalyptus obliqua</i> L'Héritier	temperate open forest	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 2-4 years
<i>Eucalyptus obliqua</i> L'Héritier	temperate open forest	flower	4	catchment	Kavanagh (1987)	n.a.	flowered in two of four years only

		abundance, % trees in flower					
<i>Eucalyptus ovata</i> Labill.	temperate open forest	flower abundance, % trees in flower	4	catchment	Kavanagh (1987)	n.a.	flowered each year
<i>Eucalyptus paniculata</i> Sm.	temperate open forest	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every 3-5 years
<i>Eucalyptus pauciflora</i> Sieber ex Spreng.	sub-alpine open forest	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 1-4 years
<i>Eucalyptus pauciflora</i> Sieber ex Spreng.	sub-alpine open forest	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every 2-3 years
<i>Eucalyptus pellita</i> F.Muell.	tropical woodland	% trees flowering	2	site	Jackson (2001)	n.a.	n=11: 9% of trees didn't flower, 46% flowered once, 45% flowered twice; among-year synchrony not reported
<i>Eucalyptus pilularis</i> Sm.	sub-tropical open forest	index of nectar production	2	region	Hawkins <i>et al.</i> (2018)	n.a.	across many sites, flowered in one year of two
<i>Eucalyptus pilularis</i> Sm.	sub-tropical open forest	presence of flowering	10	11 sites	Law <i>et al.</i> (2000)	n.a.	4.2 (1–3) flowerings in 10 years (large trees)
<i>Eucalyptus platyphylla</i> F.Muell.	tropical woodland	% trees flowering	2	site	Jackson (2001)	n.a.	n=58: 38% of trees didn't flower, 38% flowered once, 24% flowered twice; among-year synchrony not reported
<i>Eucalyptus polyanthemos</i> Schauer in W.G.Walpers	temperate woodland	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every three years
<i>Eucalyptus polyanthemos</i> Schauer in W.G.Walpers	temperate woodland	ranked flower abundance	26, 32	2 forests	Keatley and Hudson (2007)	n.a.	some flowering in 67 & 88% of years
<i>Eucalyptus populnea</i> Hook. in T.L.Mitchell	sub-tropical woodland	capsule fall	2	site	Burrows and Burrows (1992)	0.67	1 of 2 sites; flowering both years, with 2.8-fold variation among years
<i>Eucalyptus populnea</i> Hook. in T.L.Mitchell	sub-tropical woodland	capsule fall	2	site	Burrows and Burrows (1992)	0.74	1 of 2 sites; flowering both years, with 3.2-fold variation among years
<i>Eucalyptus propinqua</i> H.Deane & Maiden	sub-tropical open forest	presence of flowering	10	7 sites	Law <i>et al.</i> (2000)	n.a.	3.3 (2–5) flowerings in 10 years (large trees)
<i>Eucalyptus racemosa</i> Cav. ( <i>signata</i> )	sub-tropical open forest	presence of flowering	10	3 sites	Law <i>et al.</i> (2000)	n.a.	3.7 (3–4) flowerings in 10 years (large trees)
<i>Eucalyptus radiata</i> Sieber ex DC.	temperate open forest	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 2-3 years
<i>Eucalyptus radiata</i> Sieber ex DC.	temperate open forest	flower abundance, % trees in flower	4	catchment	Kavanagh (1987)	n.a.	flowered heavily each year
<i>Eucalyptus regnans</i> F.Muell.	temperate open forest	opercula fall	5	site	Ashton (1975)	1.23	some flowers produced in mature forest each year, with 42-fold variation
<i>Eucalyptus regnans</i> F.Muell.	temperate open forest	qualitative flower abundance	24	plateau	Ashton (1975)	n.a.	flowering across plateau peaked every 2-4 yrs
<i>Eucalyptus regnans</i> F.Muell.	temperate open forest	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every five years
<i>Eucalyptus regnans</i> F.Muell.	wet sclerophyll forest	opercula fall	5	?state	Fagg <i>et al.</i> (2013)	n.a.	heavy flowering in 2 of 5 years; heaviest was 19-fold greater than lightest
<i>Eucalyptus regnans</i> F.Muell.	wet sclerophyll forest	flowering	?	site	Ferguson (2011)	n.a.	probability of good flowering follow previous good

					from Flint & Fagg (2007)		flowering is low until 0.7 in fourth year
<i>Eucalyptus resinifera</i> Sm. in J.White	sub-tropical open forest	presence of flowering	10	3 sites	Law <i>et al.</i> (2000)	n.a.	2.8 (1–4) flowerings in 10 years (large trees)
<i>Eucalyptus robusta</i> Sm.	sub-tropical open forest	index of nectar production	2	site	Hawkins <i>et al.</i> (2018)	n.a.	flowered in one year of two
<i>Eucalyptus robusta</i> Sm.	sub-tropical open forest	presence of flowering	10	site	Law <i>et al.</i> (2000)	n.a.	8 flowerings in 10 years (large trees)
<i>Eucalyptus rubida</i> H.Deane & Maiden	temperate open forest	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every two years
<i>Eucalyptus saligna</i> Sm.	sub-tropical open forest	index of nectar production	2	region	Hawkins <i>et al.</i> (2018)	n.a.	c. 100-fold variation between years
<i>Eucalyptus saligna</i> Sm.	sub-tropical open forest	presence of flowering	10	3 sites	Law <i>et al.</i> (2000)	n.a.	3.7 (0–6) flowerings in 10 years (large trees)
<i>Eucalyptus salmonophloia</i> F.Muell.	semi-arid woodland	% trees in flower	3	site	Yates <i>et al.</i> (1994)	1.29	1 of 4 sites; flowering occurred in 2 of 3 years
<i>Eucalyptus salmonophloia</i> F.Muell.	semi-arid woodland	% trees in flower	3	site	Yates <i>et al.</i> (1994)	1.73	1 of 4 sites; flowering occurred in 1 of 3 years
<i>Eucalyptus salmonophloia</i> F.Muell.	semi-arid woodland	% trees in flower	3	site	Yates <i>et al.</i> (1994)	1.73	1 of 4 sites; flowering occurred in 1 of 3 years
<i>Eucalyptus salmonophloia</i> F.Muell.	semi-arid woodland	% trees in flower	3	site	Yates <i>et al.</i> (1994)	1.73	1 of 4 sites; flowering occurred in 1 of 3 years
<i>Eucalyptus siderophloia</i> Benth.	sub-tropical open forest	presence of flowering	10	6 sites	Law <i>et al.</i> (2000)	n.a.	6.1 (5–7) flowerings in 10 years (large trees)
<i>Eucalyptus siderophloia</i> Benth.	sub-tropical open forest	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every 1-3 years
<i>Eucalyptus sideroxylon</i> A.Cunn. ex Woolls	temperate/sub-tropical woodlands	qualitative mass flowering	?	state (NSW)	Somerville and Nicholson (2005)	n.a.	beekeeper reports of (mass-)flowering: every 2-3 years
<i>Eucalyptus sieberi</i> L.A.S.Johnson	temperate open forest	opercula fall	4	site	Bassett (2002)	0.65	some flowering each year with 4.0-fold variation among years
<i>Eucalyptus socialis</i> F. Muell. Ex Miq.	mallee	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every four years
<i>Eucalyptus tereticornis</i> Sm.	tropical woodland	% trees flowering	2	site	Jackson (2001)	n.a.	n=19: 5% of trees didn't flower, 11% flowered once, 84% flowered twice; among-year synchrony not reported
<i>Eucalyptus tereticornis</i> Sm.	sub-tropical open forest	presence of flowering	10	4 sites	Law <i>et al.</i> (2000)	n.a.	7.3 (5–9) flowerings in 10 years (large trees)
<i>Eucalyptus tetrapleura</i> L.A.S.Johnson	sub-tropical open forest	presence of flowering	10	site	Law <i>et al.</i> (2000)	n.a.	6 flowerings in 10 years (large trees)
<i>Eucalyptus tetradonta</i> F.Muell.	tropical savanna	% trees in fruit	3	site	Williams <i>et al.</i> (1999)	0.44	some flowering each year
<i>Eucalyptus tetradonta</i> F.Muell.	tropical savanna	% trees reproductive	3	2 sites	Setterfield and Williams (1996)	0.53	some flowering each year
<i>Eucalyptus tetradonta</i> F.Muell.	tropical savanna	flower abundance index	3	37 plots across large mine site	Brady (2009)	n.a.	peak flowering index varied between years 192-fold
<i>Eucalyptus tricarpa</i> (L.A.S.Johnson) L.A.S.Johnson & K.D.Hill	temperate woodland	opercula fall	3	site	Keatley and Murray (2011)	1.48	at second site, flowering was negligible in 1 of 3 years
<i>Eucalyptus tricarpa</i> (L.A.S.Johnson)	temperate woodland	qualitative mass	?	region/state	Birtchnell and	n.a.	beekeeper reports of mass-flowering: every 2-3 years



L.A.S.Johnson & K.D.Hill		flowering			Gibson (2006)		
<i>Eucalyptus tricarpa</i> (L.A.S.Johnson) L.A.S.Johnson & K.D.Hill	temperate woodland	ranked flower abundance	25, 32	2 forests	Keatley and Hudson (2007)	n.a.	highly variable between years; some flowering in 92 & 84% of years; concordant between forests
<i>Eucalyptus tricarpa</i> (L.A.S.Johnson) L.A.S.Johnson & K.D.Hill	temperate woodland	flowering intensity	11	region	Mac Nally <i>et al.</i> (2009)	n.a.	"moderate or heavy flowering" in 6 years, "limited or complete absence" in 5 years
<i>Eucalyptus tricarpa</i> (L.A.S.Johnson) L.A.S.Johnson & K.D.Hill ( <i>sideroxylon</i> )	temperate woodland	flowering	?	region	Porter (1978)	n.a.	particularly high or low flowering occurred at intervals of 3-11 years
<i>Eucalyptus viminalis</i> Labill.	temperate open forest	opercula fall	6	site	Dooley <i>et al.</i> (2010)	0.96	inflorescence bud production varied 6.7 fold over 5 years; capsule set varied 20.4 fold
<i>Eucalyptus viminalis</i> Labill.	temperate open forest	qualitative mass flowering	?	region/state	Birtchnell and Gibson (2006)	n.a.	beekeeper reports of mass-flowering: every 2-5 years
<i>Eucalyptus viminalis</i> Labill.	temperate open forest	flower abundance, % trees in flower	3	catchment	Kavanagh (1987)	n.a.	flowered each year with c. 8-fold variation in % of trees flowering

- Ashton DH (1975) Studies of flowering behaviour in *Eucalyptus regnans* F.Muel. *American Journal of Botany* 23, 399-411.
- Bassett OD (2002) Flowering and seed crop development in *Eucalyptus sieberi* L. Johnson and *E. globoidea* Blakely in a lowland sclerophyll forest in East Gippsland, Victoria. *Australian Forestry* 65, 237-255.
- Birtchnell MJ, Gibson M (2006) Long-term flowering patterns of melliferous *Eucalyptus* (Myrtaceae) species. *American Journal of Botany* 54, 745-754.
- Brady CJ (2009) Seasonality of nectar production by woodland plants on the Gove Peninsula. *The Northern Territory Naturalist* 21, 34-44.
- Burrows DM, Burrows WH (1992) Seed production and litter fall in some eucalypt communities in central Queensland. *Australian Journal of Botany* 40, 389-403.
- Dooley GM, Murray MD, Lutze MT, McCarthy GJ, Perry PC, Fagg PC (2010) Seedcrop development in *Eucalyptus viminalis* in high-elevation mixed species forest of East Gippsland. *Australian Forestry* 73, 24-33.
- Fagg P, Lutze M, Slijkerman C, Ryan M, Bassett O (2013) Silvicultural recovery in ash forests following three recent large bushfires in Victoria. *Australian Forestry* 76, 140-155.
- Ferguson I (2011) Strategic seedbanks to meet fire risks for Victorian ash-type species. *Australian Forestry* 74, 97-107.
- Flint A, Fagg P (2007) 'Mountain Ash in Victorias State Forests. Silviculture Reference Manual No. 1'. (Department of Sustainability and Environment: Melbourne)
- Franklin DC, Barnes TA, Winlaw A (2016) A mast flowering event in a eucalypt of tropical upland dry sclerophyll forest. *North Queensland Naturalist* 46, 1-10.
- Goldingay RL (1990) The foraging behaviour of a nectar feeding marsupial, *Petaurus australis*. *Oecologia* 85, 191-199.
- Hawkins BA, Thomson JR, Mac Nally R (2018) Regional patterns of nectar availability in subtropical eastern Australia. *Landscape Ecology* 33, 999-1012.
- House SM (1997) Reproductive biology of eucalypts. In 'Eucalypt Ecology: Individuals to Ecosystems'. (Eds. JE Williams, JCZ Woinarski) pp. 30-55. (Cambridge University Press: Cambridge).
- Jackson SM (2001) Foraging behaviour and food availability of the mahogany glider *Petaurus gracilis* (Petauridae: Marsupialia). *Journal of Zoology London* 253, 1-13.
- Jensen AE, Walker KF, Paton DC (2007) Using phenology of eucalypts to determine environmental watering regimes for the River Murray floodplain, South Australia. In 'Proceedings of the 5th Australian Stream Management Conference. Australian rivers: making a difference'. (Eds. AL Wilson, RL Dehaan, RJ Watts, KJ Page, KH Bowmer, A Curtis) pp. 175-180. (Charles Sturt University: Thurgoon, New South Wales)
- Kavanagh RP (1987) Forest phenology and its effect on foraging behaviour and selection of habitat by the yellow-bellied glider, *Petaurus australis* Shaw. *Australian Wildlife Research* 14, 371-384.
- Keatley MR, Bren LJ, Hudson IL (2021) The historic flowering behaviour of River Red-gum and Black Box in a flooding forest. *Austral Ecology* 46, 640-652.
- Keatley MR, Hudson IL (2007) A comparison of long-term flowering patterns of Box-Ironbark species in Havelock and Rushworth forests. *Environmental Modeling & Assessment* 12, 279-292.
- Keatley MR, Murray MD (2011) 'Flowering and seed crop development of *Eucalyptus tricarpa* in East Gippsland'. (Victorian Department of Sustainability and Environment Research Report No. 399: East Melbourne)
- Koch P (2005) 'Factors influencing food availability for the endangered south-eastern Red-tailed Black Cockatoo *Calyptorhynchus banksii* graptogyne in remnant stringybark woodland, and implications for management'. (University of Adelaide PhD thesis: Adelaide).
- Law B, Mackowski C, Schoer L, Tweedie T (2000) Flowering phenology of myrtaceous trees and their relation to climatic, environmental and disturbance variables in northern New South Wales. *Austral Ecology* 25, 160-178.
- Loneragan OW (1979) 'Karri (*Eucalyptus diversicolor* F. Muell.): phenological studies in relation to reforestation'. (Forests Department of Western Australia: Perth).

- Mac Nally R, Bennett AF, Thomson JR, Radford JQ, Unmack G, Horrocks G, Vesk PA (2009) Collapse of an avifauna: climate change appears to exacerbate habitat loss and degradation. *Diversity and Distributions* 15, 720-730.
- Pook EW, Gill AM, Moore PHR (1997) Long-term variation of litter fall, canopy leaf area and flowering in a *Eucalyptus maculata* forest on the south coast of New South Wales. *Australian Journal of Botany* 45, 737-755.
- Porter JW (1978) Relationships between flowering and honey production of Red Ironbark, *Eucalyptus sideroxylon* (A. Cunn.) Benth., and climate in the Bendigo district of Victoria. *Australian Journal of Agricultural Research* 29, 815-829.
- Semple WS, Koen TB, Henderson J (2007) Seed fall and flowering in white box (*Eucalyptus albens* Benth.) trees near Cowra, New South Wales. *Australian Forestry* 70, 242-252.
- Setterfield SA, Williams RJ (1996) Patterns of flowering and seed production in *Eucalyptus miniata* and *E. tetradonta* in a tropical savanna woodland, northern Australia. *Australian Journal of Botany* 44, 107-122.
- Somerville DC, Nicholson D (2005) The primary melliferous flora and other aspects associated with beekeeping within State forests of New South Wales as determined by surveys of beekeepers. *Australian Forestry* 68, 9-16.
- Williams RJ, Myers BA, Eamus D, Duff GA (1999) Reproductive phenology of woody species in a north Australian tropical savanna. *Biotropica* 31, 626-636.
- Yates CJ, Hobbs RJ, Bell RW (1994) Factors limiting the recruitment of *Eucalyptus salmonophloia* in remnant woodlands. 1. Pattern of flowering, seed production and seed fall. *Australian Journal of Botany* 42, 531-542.