

Polyembryony and apomixis in Cerrado Brazilian savannas: types, phylogenetic constraints, and ecological implications

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Online Resource 1. Cerrado species with records of embryony types. ET: Embryony type; Poly: Polyembryonic; Mono: Monoembryonic; BS: Breeding System; AP: apomixis, D: dioecy, SI: self-incompatibility, SC: self-compatibility. Repeated species had populations with departing embryony type.

Family	Specie	EP	Habit	BS	Reference
Anacardiaceae	<i>Astronium fraxinifolium</i> Schott	P	Tree	AP, D	Allem 1991 (Breeding system); This study (Embryony type)
	<i>Lithraea molleoides</i> (Vell.) Engl.	M	Tree	AP, D	Chiapero et al. 2021 (Breeding system); This study (Embryony type)
	<i>Astronium urundeuva</i> (M.Allemão) Engl.	P	Tree	D	Machado et al. 2006 (Breeding system); This study (Embryony type)
	<i>Schinopsis brasiliensis</i> Engl.	M	Tree	D	Kiill et al. 2010 (Breeding system); Salomão and Allem 2001(Embryony type)
	<i>Tapirira guianensis</i> Aubl.	P	Tree	D	Lenza and Oliveira 2005 (Breeding system); Salomão and Allem 2001 (Embryony type)
Apocynaceae	<i>Aspidosperma cylindrocarpon</i> Müll.Arg.	M	Tree		This study (Embryony type)
	<i>Aspidosperma discolor</i> A.DC.	M	Tree		Salomão and Allem 2001 (Embryony type)
	<i>Aspidosperma macrocarpon</i> Mart. & Zucc.	M	Tree	SI	Oliveira et al. 2004 (Breeding system); Salomão and Allem 2001(Embryony type)

	<i>Aspidosperma parvifolium</i> A. DC.	M	Tree		Salomão and Allem 2001 (Embryony type)
	<i>Hancornia speciosa</i> Gomes	P	Tree	SI	Darrault and Schlindwein 2005 (Breeding system); Salomão and Allem 2001(Embryony type)
Araliaceae	<i>Didymopanax morototoni</i> (Aubl.) Decne. & Planch.	P	Tree		This study (Embryony type)
Asteraceae	<i>Lychnophora ericoides</i> Mart.	P	Shrub	SC, AP	Avelino 2005; Ribeiro-Silva 2017 (Breeding system); This study (Embryony type)
Bignoniaceae	<i>Adenocalymma nodosum</i> (Silva Manso) L.G.Lohmann	M	Subshru b	SI	Sampaio et al. 2016 (Breeding system); This study (Embryony type)
	<i>Adenocalymma pedunculatum</i> (Vell.) L.G.Lohmann	M	Subshru b	SI	Lima et al. 2014 (Breeding System); This study (Embryony type)
	<i>Adenocalymma peregrinum</i> (Miers) L.G.Lohmann	M	Subshru b	SI	Sampaio et al. 2016 (Breeding system); This study (Embryony type)
	<i>Anemopaegma acutifolium</i> DC.	P	Subshru b	SC	Firetti-Leggieri et al. 2013 (Breeding system); Sampaio et al. 2013 (Embryony type)
	<i>Anemopaegma album</i> Mart. ex DC.	M	Subshru b		This study (Embryony type)
	<i>Anemopaegma arvense</i> (Vell.) Stellfeld ex de Souza	P	Subshru b	SC	Firetti-Leggieri et al. 2013 (Breeding system); Sampaio et al. 2013 (Embryony type)
	<i>Anemopaegma chamberlaynii</i> (Sims) Bureau & K.Schum.	P	Liana	SI	Correia et al. 2006 (Breeding system); Correia et al. 2005 (Embryony type)
	<i>Anemopaegma glaucum</i> Mart. ex DC.	P	Subshru b	SC	Firetti-Leggieri et al. 2013 (Breeding system); Sampaio et al. 2013 (Embryony type)
	<i>Cuspidaria sceptrum</i> (Cham.) L.G.Lohmann	M	Subshru b	SI	Sampaio 2010 (Breeding system); This study (Embryony type)
	<i>Fridericia platyphylla</i> (Cham.) L.G.Lohmann	M	Subshru b	SI; SC	Sampaio 2010 (Breeding system – SI); Ynagizawa and Maimoni-Rodella 2007 (Breeding system – SC); This study (Embryony type)
	<i>Fridericia platyphylla</i> (Cham.) L.G.Lohmann	P	Subshru b	SI; SC	Sampaio 2010 (Breeding system – SI); Ynagizawa and Maimoni-Rodella 2007 (Breeding system – SC); This study (Embryony type)
	<i>Pyrostegia venusta</i> (Ker Gawl.) Miers	M	Liana	SC	Sampaio and Almeida 1995 (Breeding system); This study (Embryony type)
	<i>Cybistax antisiphilitica</i> (Mart.) Mart.	M	Tree	SI	Bittencourt Jr. et al. 2011 (Breeding system); This study (Embryony type)
	<i>Handroanthus chrysotrichus</i> (Mart. ex DC.) Mattos	P	Tree	AP, SC	Bittencourt Jr. and Moraes (2010) (Breeding system); Mendes-Rodrigues et al. 2012 (Embryony type)
	<i>Handroanthus ochraceus</i> (Cham.) Mattos	P	Tree	AP, SC	Bittencourt Jr. and Moraes (2010) (Breeding system); Mendes et al.2018 (Embryony type)
	<i>Handroanthus ochraceus</i> (Cham.) Mattos	M	Tree	SI	Bawa 1974; Gibbs and Bianchi 1993; Barros 2001 (Breeding system); Mendes et al. 2018 (Embryony type)
	<i>Handroanthus serratifolius</i> (Vahl) S. Grose	P	Tree	AP, SC	Alves et al. 2016 (Breeding system); Mendes- Rodrigues et al. 2012 (Embryony type)

	<i>Handroanthus serratifolius</i> (Vahl)	M	Tree	SI	Alves et al. 2013 (Breeding system and Embryony type)
	S. Grose				
	<i>Handroanthus impetiginosus</i> (Mart. ex DC.) Mattos	M	Tree	SI	Bittencourt Jr. and Semir 2005 (Breeding system); This study (Embryony type)
	<i>Handroanthus vellosi</i> (Toledo) Mattos	M	Tree	SI	Bittencourt Jr. and Semir 2005 (Breeding system); This study (Embryony type);
	<i>Jacaranda brasiliana</i> (Lam.) Pers.	M	Tree		Salomão and Allem 2001 (Embryony type)
	<i>Jacaranda caroba</i> (Vell.) DC.	M	Subshrub	SI	Vieira et al. 1992 (Breeding system); This study (Embryony type)
	<i>Jacaranda decurrens</i> Cham.	M	Subshrub	SI	Barbosa and Sazima 2008 (Breeding system); This study (Embryony type)
	<i>Jacaranda paucifoliolata</i> Mart. ex DC.	M	Subshrub	SI	Sampaio 2010 (Breeding system); This study (Embryony type)
	<i>Jacaranda rufa</i> Silva Manso	M	Subshrub	SI	Sampaio 2010 (Breeding system); This study (Embryony type)
	<i>Jacaranda ulei</i> Bureau and K.Schum.	M	Subshrub		This study (Embryony type)
	<i>Jacaranda cuspidifolia</i> Mart.	P	Tree	SI	Bittencourt Jr. 2019 (Breeding system)
	<i>Tabebuia aurea</i> (Silva Manso) Benth. & Hook.f. ex S.Moore	M	Tree	SI	Salomão and Allem 2001 (Embryony type); Gibbs and Bianchi 1993
	<i>Tabebuia rosea</i> (Bertol.) Bertero ex A.DC.	M	Tree	SI	Bawa 1974; Bawa and Webb 1984 (Breeding system); This study (Embryony type)
	<i>Tecoma stans</i> (L.) Juss. ex Kunth	M	Tree	SC	Dutra and Machado 2001; Silva 2004 (Breeding system); This study (Embryony type)
	<i>Tabebuia roseoalba</i> (Ridl.) Sandwith	P	Tree	SI	Gandolphi and Bittencourt Jr. 2010 (Breeding System); This study (Embryony type)
	<i>Zeyheria montana</i> Mart.	M	Shrub	SI	Bittencourt Jr. and Semir 2004 (Breeding system); This study (Embryony type)
Bixaceae	<i>Bixa orellana</i> L.	M	Shrub	SC	Lombello and Pinto-Maglio 2014 (Breeding System); Salomão and Allem 2001 (Embryony type)
	<i>Cochlospermum regium</i> (Mart. ex Schrank) Pilg.	M	Subshrub	SI	Barbosa and Sazima 2008 (Breeding System); This study (Embryony type)
Boraginaceae	<i>Cordia glabrata</i> (Mart.) A.DC.	M	Tree		Salomão and Allem 2001 (Embryony type)
Burseraceae	<i>Commiphora leptophloeos</i> (Mart.) J.B.Gillett	P	Tree	D	Machado et al. 2006 (Breeding System); Salomão and Allem 2001 (Embryony type)
Urticaceae	<i>Cecropia pachystachya</i> Trécul	M	Tree	D	Ribas and Sebbenn 2004 (Breeding System); This study (Embryony type)
Calophyllaceae	<i>Calophyllum brasiliense</i> Cambess.	M	Tree	D	PE Oliveira, University of Uberlândia, BR, 'pers. comm.' (Breeding system); This study (Embryony type)
	<i>Kielmeyera coriacea</i> Mart. & Zucc.	M	Tree	SI	Oliveira and Silva 1993 (Breeding System); This study (Embryony type)
	<i>Kielmeyera grandiflora</i> (Wawra) Saddi	M	Tree	SI	Oliveira and Silva 1993 (Breeding System); This study (Embryony type)
	<i>Kielmeyera variabilis</i> Mart. & Zucc.	M	Tree	SI	Barros 2002 (Breeding System); This study (Embryony type)

Clusiaceae	<i>Clusia criuva</i> Cambess.	P	Shrub– tree		Correia et al. 2011 (Embryony type)
Connaraceae	<i>Rourea induta</i> Planch.	P	Tree	SI	Lenza et al. 2008 (Breeding System); This study (Embryony type)
Chrysobalanaceae	<i>Licania</i> sp.	M	Tree		Salomão and Allem 2001 (Embryony type)
Combretaceae	<i>Terminalia corrugata</i> (Ducke) Gere & Boatwr.	M	Tree		Salomão and Allem 2001 (Embryony type)
	<i>Terminalia actinophylla</i> Mart.	M	Tree		Salomão and Allem 2001 (Embryony type)
	<i>Terminalia argentea</i> Mart. & Zucc.	M	Tree		Salomão and Allem 2001 (Embryony type)
Costaceae	<i>Costus spiralis</i> (Jacq.) Roscoe	M	Shrub	SC	Araújo et al. 2007 (Breeding system); This study (Embryony type)
Ebenaceae	<i>Diospyros sericea</i> A.DC.	M	Tree	D	Oliveira 1996 (Breeding System); Salomão and Allem 2001 (Embryony type)
Erythroxylaceae	<i>Erythroxylum daphnites</i> Mart.	M	Tree		Medeiros and Miranda 2008 (Breeding System); This study (Embryony type)
	<i>Erythroxylum deciduum</i> A.St.-Hil.	P	Tree	SI	Matias et al. 2020 (Breeding System); This study (Embryony type)
Euphorbiaceae	<i>Mabea piriri</i> Aubl.	M	Tree		Salomão and Allem 2001 (Embryony type)
	<i>Manihot anomala</i> Pohl	M	Tree		This study (Embryony type)
Fabaceae	<i>Amburana cearensis</i> (Allemão) A.C.Sm.	M	Tree	SI	Barral 2018 (Breeding System); Salomão and Allem 2001 (Embryony type)
	<i>Anadenanthera colubrina</i> (Vell.) Brenan	M	Tree	SI	Borges et al. 2017 (Breeding System); This study (Embryony type)
	<i>Anadenanthera peregrina</i> (L.) Speg.	M		SC	Costa et al. 2003 (Breeding system); This study (Embryony type)
	<i>Apuleia leiocarpa</i> (Vogel) J.F.Macbr.	M	Tree		Salomão and Allem 2001 (Embryony type)
	<i>Bowdichia virgilioides</i> Kunth	M	Tree	SC	Silva et al. 2011 (Breeding System); Salomão and Allem 2001 (Embryony type)
	<i>Chamaecrista desvauxii</i> (Collad.) Killip	M	Tree	SC	Costa et al. 2007 (Breeding System); Salomão and Allem 2001 (Embryony type)
	<i>Copaifera langsdorffii</i> Desf.	P	Tree	SI	Freitas and Oliveira 2002 (Breeding System); Salomão and Allem 2001 (Embryony type)
	<i>Dimorphandra mollis</i> Benth.	M	Tree	SC	Abreu and Barros 2001 (Breeding System); This study (Embryony type)
	<i>Dipteryx alata</i> Vogel	M	Tree	SI	Oliveira and Sigrist 2008 (Breeding System); This study (Embryony type)
	<i>Enterolobium contortisiliquum</i> (Vell.) Morong	M	Tree		This study (Embryony type)
	<i>Enterolobium gummiferum</i> (Mart.) J.F.Macbr.	M	Tree		Salomão and Allem 2001 (Embryony type)
	<i>Hymenaea courbaril</i> L.	P	Tree	SI	Bawa 1974 (Breeding system); This study (Embryony type)
	<i>Inga cylindrica</i> (Vell.) Mart.	M	Tree		Salomão and Allem 2001 (Embryony type)
	<i>Inga edulis</i> Mart.	M	Tree	SI	Barros et al. 2013 (Breeding System); This study

				(Embryony type)
	<i>Inga ingoides</i> (Rich.) Willd.	M	Tree	SI Cruz Neto 2007 (Breeding System); Salomão and Allem 2001 (Embryony type)
	<i>Inga laurina</i> (Sw.) Willd.	P	Tree	SC, AP Araújo 2015 (Breeding system); This study (Embryony type)
	<i>Inga sessilis</i> (Vell.) Mart.	M	Tree	SI Amorim et al. 2013 (Breeding System); This study (Embryony type)
	<i>Inga vera</i> Willd.	P	Tree	Faria et al. 2004 (Embryony type)
	<i>Machaerium aculeatum</i> Raddi.	M	Tree	This study (Embryony type)
	<i>Machaerium acutifolium</i> Vogel	P	Tree	This study (Embryony type)
	<i>Machaerium hirtum</i> (Vell.) Stellfeld	M	Tree	Salomão and Allem 2001 (Embryony type)
	<i>Mimosa</i> sp.	M	Tree	Salomão and Allem 2001 (Embryony type)
	<i>Ormosia arborea</i> (Vell.) Harms	P	Tree	This study (Embryony type)
	<i>Ormosia fastigiata</i> Tul.	M	Tree	Salomão and Allem 2001 (Embryony type)
	<i>Peltogyne confertiflora</i> (Mart. ex Hayne) Benth.	M	Tree	Salomão and Allem 2001 (Embryony type)
	<i>Piptadenia gonoacantha</i> (Mart.) J.F.Macbr.	M	Tree	This study (Embryony type)
	<i>Plathymenia reticulata</i> Benth.	M	Tree	This study (Embryony type)
	<i>Platypodium elegans</i> Vogel	M	Tree	SI Hufford and Hamrick 2003 (Breeding system); This study (Embryony type)
	<i>Pterodon emarginatus</i> Vogel	M	Tree	SI Afonso 1997; Rocha 2006 (Breeding System); Salomão and Allem 2001 (Embryony type)
	<i>Tachigali vulgaris</i> L.G.Silva & H.C.Lima	M	Tree	SI Oliveira 1991a (Breeding System); Salomão and Allem 2001 (Embryony type)
	<i>Senegalia polyphylla</i> (DC.) Britton & Rose	P	Tree	This study (Embryony type)
	<i>Senna macranthera</i> (DC. ex Collad.) H.S.Irwin & Barneby	P	Tree	SC Almeida et al. 2015 (Breeding system); This study (Embryony type)
	<i>Senna rugosa</i> (G.Don) H.S.Irwin & Barneby	P	Shrub– subshrub	Resende et al. 2014 (Embryony type)
	<i>Senna</i> sp.	M	Tree	Salomão and Allem 2001 (Embryony type)
	<i>Senna sylvestris</i> (Vell.) H.S. Irwin & Barneby	P	Tree	SI Carvalho and Oliveira 2003 (Breeding System); This study (Embryony type)
	<i>Stryphnodendron adstringens</i> (Mart.) Coville	M	Tree	SI Ortiz et al. 2003 (Breeding System); This study (Embryony type)
	<i>Stryphnodendron polyphyllum</i> Mart.	M	Tree	Salomão and Allem 2001 (Embryony type)
Celastraceae	<i>Peritassa campestris</i> (Cambess.) A.C.Sm.	P	Tree	SI Barbosa and Sazima 2008 (Breeding System); This study (Embryony type)
	<i>Salacia crassifolia</i> (Mart. ex Schult.) G.Don	P	Tree	This study (Embryony type)
	<i>Salacia</i> sp.	M	Tree	Salomão and Allem 2001 (Embryony type)

Lamiaceae	<i>Aegiphila verticillata</i> Vell.	M	Tree	D	Oliveira 1996 (Breeding system); This study (Embryony type)
Lecythidaceae	<i>Cariniana estrellensis</i> (Raddi) Kuntze	M	Tree		This study (Embryony type)
Lythraceae	<i>Diplusodon virgatus</i> Pohl	M	Tree		This study (Embryony type)
	<i>Lafoensia pacari</i> A.St.-Hil.	M	Tree		Salomão and Allem 2001 (Embryony type)
	<i>Physocalymma scaberrimum</i> Pohl	M	Tree		Salomão and Allem 2001 (Embryony type)
Malpighiaceae	<i>Byrsonima basiloba</i> A.Juss.	P	Tree		Salomão and Allem 2001 (Embryony type)
	<i>Peixotoa tomentosa</i> A.Juss.	P	Shrub–subshrub	SC	Vilela et al. 2018 (Breeding System); This study (Embryony type)
Malvaceae	<i>Apeiba tibourbou</i> Aubl.	M	Tree		Salomão and Allem 2001 (Embryony type)
	<i>Ceiba speciosa</i> (A.St.-Hil.) Ravenna	M	Tree	SI	Gibbs and Bianchi 1993 (Breeding system); This study (Embryony type)
	<i>Eriotheca candolleana</i> (K.Schum.) A.Robyns	M	Tree	SI	J Semir, University of Unicamp, BR, ‘pers. comm.’ (Breeding System); This study (Embryony type)
	<i>Eriotheca estevesiae</i> Carv.-Sobr.	M	Tree		This study (Embryony type)
	<i>E. crenulata</i> (K. Schum.) Yoshikawa & M.C. Duarte	M	Tree	SI	Oliveira et al. 1992; Mendes-Rodrigues et al. 2005; Mendes-Rodrigues et al. 2019 (Breeding System); This study (Embryony type)
	<i>E. crenulata</i> (K. Schum.) Yoshikawa & M.C. Duarte	P	Tree	AP, SC	Mendes-Rodrigues et al. 2019 (Embryony type and Breeding System)
	<i>Eriotheca parvifolia</i> (Mart. & Zucc.) A.Robyns	M	Tree		This study (Embryony type)
	<i>Eriotheca pubescens</i> (Mart. & Zucc.) Schott & Endl.	P	Tree	AP, SC	Oliveira et al. 1992, Mendes-Rodrigues et al. 2005; Mendes-Rodrigues et al. 2019 (Breeding System); This study (Embryony type)
	<i>Eriotheca pubescens</i> (Mart. & Zucc.) Schott & Endl.	M	Tree	SI	Mendes-Rodrigues et al. 2019 (Breeding System and Embryony type)
	<i>Guazuma ulmifolia</i> Lam.	P	Tree	SI	Bullock 1985 (Breeding System); This study (Embryony type)
	<i>Helicteres corylifolia</i> Nees & Mart.	M	Tree		Salomão and Allem 2001 (Embryony type)
	<i>Luehea divaricata</i> Mart.	M	Tree		This study (Embryony type)
	<i>Pachira glabra</i> Pasq.	P	Tree	AP, SC	Baker 1960; Duncan 1970 (Breeding System); This study (Embryony type)
	<i>Pseudobombax longiflorum</i> (Mart.) A.Robyns	M	Tree		This study (Embryony type)
	<i>Pseudobombax minimum</i> Carv.-Sobr. & L.P.Queiroz	M	Tree		This study (Embryony type)
	<i>Pseudobombax tomentosum</i> (Mart.) A.Robyns	M	Tree	SI	Nasário 2014 (Breeding System); This study (Embryony type)
	<i>Sterculia striata</i> A.St.-Hil. & Naudin	M	Tree		Salomão and Allem 2001 (Embryony type)
Melastomataceae	<i>Acisanthera alsinaefolia</i> (Mart. & Schrank ex DC.) Triana	M	Shrub–subshrub		Mendes-Rodrigues et al. 2012 (Embryony type)

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<i>Cambessedesia hilariana</i> (Kunth) DC.	M	Herb–subshrub–shrub	SC	Fracasso and Sazima 2004 (Breeding system); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Cambessedesia regnelliana</i> Cogn.	M	Shrub	SC	Santos et al. 2012 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Chaetogastra gracilis</i> (Bonpl.) DC.	M	Subshrub	SC	Franco et al. 2011 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Chaetostoma armatum</i> (Spreng.) Cogn.	P	Shrub	SC	Maia 2016 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Desmoscelis villosa</i> (Aubl.) Naudin	M	Herb	SC	Ramirez and Brito 1990 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia adenothrix</i> (Cogn.) R.Goldenb.	M	Shrub		Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia albicans</i> (Sw.) Steud.	P	Shrub–tree	AP	Goldenberg and Shepherd 1998 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia angelana</i> R.Romero & R.Goldenb.	M	Tree	SC	Santos et al. 2010 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia auricoma</i> (Spring. ex Mart.) R.Goldenb.	M	Shrub – tree	AP	Maia 2013 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia auricoma</i> (Spring. ex Mart.) R.Goldenb.	P	Shrub – tree	AP	Maia 2013 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia biserrata</i> (DC.) Michelang.	P	Shrub		Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia chamissois</i> Naudin	M	Shrub–tree	SI	Souza-Silva 2000 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia crenata</i> (Vahl.) Michelang.	P	Shrub	AP	Melo et al. 1999 (Breeding system); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia cuspidata</i> Naudin	P	Tree		Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia dependens</i> (Pav. ex D. Don) Judd & Majure	P	Shrub	AP	Ramirez and Brito 1990; Melo et al. 1999 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia elegans</i> Cogn.	P	Shrub–tree	SI	Borges 1991 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia erostrata</i> (DC.) R.Goldenb.	P	Shrub		Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia erostrata</i> (DC.) R.Goldenb.	M	Shrub		Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia fallax</i> DC.	P	Shrub	AP	Goldenberg and Shepherd 1998 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia ferruginata</i> DC.	P	Shrub–tree	AP	Santos et al. 2012 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia ibaguensis</i> (Bonpl.) Triana	P	Shrub–tree	AP	Hokche and Ramírez 2008 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)	
<i>Miconia leacongeliflora</i> R.Goldenb.	P	Subshrub–shrub		Mendes-Rodrigues et al. 2012 (Embryony type)	

<i>Miconia leacoriacea</i> R.Goldenb.	M	Shrub		Mendes-Rodrigues et al. 2012 (Embryony type)
<i>Miconia leahumilis</i> R.Goldenb.	M	Subshrub–shrub		Mendes-Rodrigues et al. 2012 (Embryony type)
<i>Miconia ligustroides</i> (DC.) Naudin	P	Shrub–tree	AP	Goldenberg and Shepherd 1998 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)
<i>Miconia nervosa</i> (Sm.) Triana	M	Shrub–tree		Mendes-Rodrigues et al. 2012 (Embryony type)
<i>Miconia pepericarpa</i> DC.	M	Shrub–tree	SI	Goldenberg and Shepherd 1998 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)
<i>Miconia rubiginosa</i> (Bonpl.) DC.	P	Shrub–tree	AP	Goldenberg and Shepherd 1998 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)
<i>Miconia sellowiana</i> Naudin	P	Shrub–tree	SC, AP	Saraiva 1996 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)
<i>Miconia stenostachya</i> DC.	P	Shrub	AP	Goldenberg and Shepherd 1998 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)
<i>Miconia theaezans</i> (Bonpl.) Cogn.	M	Shrub–tree	SC, SI	Borges 1991; Maia 2013 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)
<i>Miconia tococa</i> (Desr.) Michelang.	M	Tree	SI	Hokche and Ramirez 2008 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)
<i>Microlicia canastrensis</i> Naudin	M	Subshrub		Mendes-Rodrigues et al. 2012 (Embryony type)
<i>Microlicia cataphracta</i> (DC.) Versiane & Romero	M	Shrub – subshrub	SC	Santos et al. 2012 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony type)
<i>Microlicia hirsuta</i> (DC.) R.Romero, Versiane & Woodgyer	P	Subshrub–shrub	AP	Viana et al. 2021 (Breeding system and Embryony type)
<i>Microlicia helvola</i> (Spreng.) Triana	P	Subshrub–shrub		Mendes-Rodrigues et al. 2012 (Embryony type)
<i>Microlicia inquinans</i> Naudin	M	Shrub	SC	Santos et al. 2012 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony pattern)
<i>Microlicia isophylla</i> DC.	M	Subshrub–shrub		Mendes-Rodrigues et al. 2012 (Embryony pattern)
<i>Microlicia johnwurdackiana</i> R.Romero & Valentim	P		AP	Viana et al. 2021 (Breeding system and Embryony pattern)
<i>Microlicia polystemma</i> Naudin	P	Subshrub	AP	Viana et al. 2021 (Breeding system and Embryony pattern)
<i>Pleroma frigidulum</i> (Schränk et Mart. ex DC.) Triana	M	Subshrub–shrub	SC	Santos et al. 2012 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony pattern)
<i>Pleroma heteromallum</i> (D.Don) D.Don	M	Shrub	SC	Campos et al. 2009 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony pattern)
<i>Pleroma villosissimum</i> Triana	M	Shrub	SC	Santos et al. 2012 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony pattern)
<i>Pterolepis repanda</i> (DC.) Triana	M	Herb		Mendes-Rodrigues et al. 2012 (Embryony pattern)
<i>Rhynchanthera dichotoma</i> (Desr.) DC.	M	Subshrub–shrub	SC	Guimarães and Ranga 1997 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony pattern)
<i>Rhynchanthera grandiflora</i> (Aubl.)	M	Subshrub	SC	Santos et al. 2012 (Breeding System); Mendes-

	DC.		b-shrub		Rodrigues et al. 2012 (Embryony pattern)
	<i>Svitramia hatschbachii</i> Wurdack	M	Shrub	SC	Santos et al. 2012 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony pattern)
	<i>Pleroma minus</i> (R.Romero & A.B.Martins) P.J.F.Guim.	M	Tree	SC	Santos et al. 2012 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony pattern)
	<i>Svitramia</i> sp. nov. 1	M		SC	Santos et al. 2012 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony pattern)
	<i>Svitramia</i> sp. nov. 2	M			Mendes-Rodrigues et al. 2012 (Embryony pattern)
	<i>Pleroma wurdackianum</i> (R.Romero & A.B.Martins) P.J.F.Guim. & Michelang.	M	Shrubs or subshrubs		Mendes-Rodrigues et al. 2012 (Embryony pattern)
	<i>Tibouchina aegopogon</i> (Naudin) Cogn.	M	Subshrub	SI	Santos et al. 2012 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony pattern)
	<i>Trembleya parviflora</i> (D. Don) Cogn.	M	Shrub-tree	AP, SC	Souza-Silva 2000; Maia 2013 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony pattern)
	<i>Trembleya phlogiformis</i> Mart. & Schrank ex DC.	M	Subshrub-shrub		Mendes-Rodrigues et al. 2012 (Embryony pattern)
Meliaceae	<i>Cedrela fissilis</i> Vell.	M	Tree		This study (Embryony pattern)
Siparunaceae	<i>Siparuna guianensis</i> Aubl.	M	Tree	D	Salomão and Allem 2001 (Embryony pattern), Bawa et al.1985 (Breeding System)
Moraceae	<i>Brosimum gaudichaudii</i> Trécul	M	Tree		This study (Embryony pattern)
Myristicaceae	<i>Virola sebifera</i> Aubl.	M	Tree	D	Lenza and Oliveira 2006 (Breeding System); Mendes-Rodrigues et al. 2012 (Embryony pattern)
Myrtaceae	<i>Campomanesia adamantium</i> (Cambess.) O.Berg	M	Tree	SI	Nucci and Alves-Junior 2017 (Breeding System); Salomão and Allem 2001 (Embryony pattern)
	<i>Campomanesia pubescens</i> (Mart. ex DC.) O.Berg	P	Tree	SC, SI	Bórem et al. 2009; Torezan-Silingardi and Del-Claro 1998; Proença and Gibbs 1994 (Breeding System); This study (Embryony pattern)
	<i>Eugenia involucrata</i> DC.	P	Tree	SC	Carvalho 2009; This study (Embryony pattern)
	<i>Eugenia dysenterica</i> (Mart.) DC.	M	Tree	SC	Proença and Gibbs 1994; Salomão and Allem 2001 (Embryony pattern)
	<i>Eugenia glandulosa</i> Cambess.	P	Tree		This study (Embryony pattern)
	<i>Eugenia luschnathiana</i> (O.Berg) Klotzsch ex B.D.Jacks.	M	Tree		Gurgel and Sobrinho 1951 (Embryony pattern)
	<i>Eugenia myrcianthes</i> Nied.	M	Shrub or tree		Gurgel and Sobrinho 1951 (Embryony pattern)
	<i>Eugenia pyriformis</i> Cambess.	M	Shrubs, subshrubs or tree		Gurgel and Sobrinho 1951 (Embryony pattern)
	<i>Eugenia punicifolia</i> (Kunth) DC.	P	Tree	SC	Silva and Pinheiro 2009 (Breeding System); This study (Embryony pattern)
	<i>Eugenia uniflora</i> L.	M	Shrub	SI	Pelacani et al. 2000 (Breeding System); Gurgel and Sobrinho 1951 (Embryony pattern)

	<i>Myrcia</i> sp	M	Tree		This study (Embryony pattern)
	<i>Psidium cattleianum</i> Sabine	M	Tree	SC	Costa et al. 2015 (Breeding System); This study (Embryony pattern)
	<i>Psidium salutare</i> (Kunth) O.Berg	M	Shrubs or subshrubs		Gurgel and Sobrinho 1951 (Embryony pattern)
Ochnaceae	<i>Ouratea spectabilis</i> (Mart.) Engl.	P	Tree	SI	Montesinos and Oliveira 2014 (Breeding system); This study (Embryony pattern)
Orchidaceae	<i>Zygopetalum maculatum</i> (Kunth) Garay	P	Herb	SC	Campacci et al. 2017 (Embryony pattern and Breeding system)
Polygonaceae	<i>Triplaris gardneriana</i> Wedd.	M	Tree	D	Custodio et al. 2017 (Breeding System); Salomão and Allem 2001 (Embryony pattern)
Rhamnaceae	<i>Zizyphus joazeiro</i> Mart.	P	Tree	SC	Pinheiro et al. 1991 (Breeding System); Salomão and Allem 2001 (Embryony pattern)
Rubiaceae	<i>Coussarea hydrangeifolia</i> (Benth.) Müll.Arg.	M	Tree	SI	Pereira 2007 (Breeding System); This study (Embryony pattern)
	<i>Genipa americana</i> L.	P	Tree	AP, D	Crestana 1995 (Breeding system); This study (Embryony pattern)
	<i>Guettarda pohliana</i> Müll.Arg.	M	Tree		Salomão and Allem 2001 (Embryony pattern)
	<i>Palicourea rigida</i> Kunth	M	Tree	SI	Salomão and Allem 2001 (Embryony pattern), Barbosa and Sazima 2008 (Breeding System)
	<i>Tocoyena formosa</i> (Cham. & Schltdl.) K.Schum.	M	Tree	SI	Saraiva et al. 1996 (Breeding system); Salomão and Allem 2001 (Embryony pattern)
Salicaceae	<i>Casearia sylvestris</i> Sw.	P	Tree	SC	Barbosa and Sazima 2008 (Breeding System); This study (Embryony type)
Sapindaceae	<i>Magonia pubescens</i> A.St.-Hil.	P	Tree		Salomão and Allem 2001 (Embryony pattern)
	<i>Sapindus saponaria</i> L.	M	Tree		Salomão and Allem 2001 (Embryony pattern)
	<i>Talisia esculenta</i> (Cambess.) Radlk.	M	Tree	D	Silva 2019 (Breeding System); Salomão and Allem 2001 (Embryony pattern)
Santalaceae	<i>Phoradendron quadrangulare</i> (Kunth) Griseb.	M	Herb		This study (Embryony pattern)
Styracaceae	<i>Styrax camporum</i> Pohl	M	Tree	SI	Saraiva et al. 1988 (Breeding system); Salomão and Allem 2001 (Embryony type)
Velloziaceae	<i>Vellozia squamata</i> Pohl	M	Tree	SI	Oliveira et al. 1991b (Breeding System); This study (Embryony type)
Vochisiaceae	<i>Callisthene fasciculata</i> Mart.	P	Tree	SI	Oliveira 1998 (Breeding System); This study (Embryony type)
	<i>Callisthene major</i> Mart.	P	Tree	SI	Oliveira 1998 (Breeding System); This study (Embryony type)
	<i>Qualea grandiflora</i> Mart.	M	Tree	SI	Oliveira 1998 (Breeding System); This study (Embryony type)
	<i>Qualea multiflora</i> Mart.	M	Tree	SI	Oliveira 1998 (Breeding System); This study (Embryony type)

<i>Qualea parviflora</i> Mart.	M	Tree	SI	Oliveira 1998 (Breeding System); This study (Embryony type)
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Reference

- Abreu LCR, Barros MAG (2001) Biologia reprodutiva de *Dimorphandra mollis* Benth. In: 52º Congresso Nacional de Botânica, XXIV Reunião Nordestina de Botânica. Soc Bot Brasil, Univ Fed Paraíba, João Pessoa, Paraíba, Brasil.
- Afonso AP (1997) Biologia reprodutiva de *Pterodon pubescens* Benth. e *Pterodon polygaliflorus* Benth. (Fabaceae – Papilionoideae) em áreas de cerrado do Distrito Federal. Master Dissertation, Univ Brasília, Brasil.
- Allem AC (1991) Estudo da biologia reprodutiva de duas espécies florestais (aroeira e gonçalo-alves) da região do cerrado. *Pesqui Andam* 2:1–5.
- Almeida NM, Bezerra TT, Oliveira CRS et al. (2015) Breeding systems of enantiostylous Cassiinae species (Fabaceae, Caesalpinioideae). *Flora* 215:9–15.
<https://doi.org/10.1016/j.flora.2015.06.003>
- Alves MF, Duarte MO, Bittencourt NS Jr, Oliveira PE, Sampaio DS (2016) Sporophytic apomixis in polyembryonic *Handroanthus serratifolius* (Vahl) SO Grose (Bignoniaceae) characterizes the species as an agamic polyploid complex. *Plant Syst Evol* 302:651–659.
<https://doi.org/10.1007/s00606-016-1291-9>
- Alves MF, Duarte MO, Oliveira PE, Sampaio DS (2013) Self-sterility in the hexaploid *Handroanthus serratifolius* (Bignoniaceae), the national flower of Brazil. *Acta Bot Bras* 27:714–722. <https://doi.org/10.1590/S0102-33062013000400010>
- Amorim FW, Galetto L, Sazima M (2013) Beyond the pollination syndrome: nectar ecology and the role of diurnal and nocturnal pollinators in the reproductive success of *Inga sessilis* (Fabaceae). *Plant Biol* 15:317–327. <https://doi.org/10.1111/j.1438-8677.2012.00643.x>
- Araújo FP, Oliveira PE (2007) Biologia floral de *Costus spiralis* (Jacq.) Roscoe (Costaceae) e mecanismos para evitar a autopolinização. *Rev Bras Bot* 30:61–70.
<https://doi.org/10.1590/S0100-84042007000100007>

- 1 Araújo NAV (2015) Embriologia, apomixia e poliembrionia em *Inga laurina* (Sw.) Willd
2 (Fabaceae – Mimosoideae). Master Dissertation, Univ Fed Uberlândia, Brasil.
3 <https://doi.org/10.14393/ufu.di.2015.105>
- 4 Avelino AS (2005) Biologia Reprodutiva de *Lychnophora ericoides* Mart. (Asteraceae:
5 Vernoniaceae). Master Dissertation, Univ Brasília, Brasil
- 6 Baker HG (1960) Apomixis and polyembryony in *Pachira oleaginea* (Bombacaceae). Am J Bot
7 47:296–302. <https://doi.org/10.1002/j.1537-2197.1960.tb07128.x>
- 8 Barbosa AAA, Sazima M (2008) Biologia reprodutiva de plantas herbáceo-arbustivas de uma
9 área de campo-sujo de Cerrado. Cerrado: ecologia e flora 1.
- 10 Barral EC (2018) Biologia reprodutiva, ecologia de populações e filogeografia de *Amburana*
11 *cearensis*, Leguminosae ameaçada de extinção. PhD Thesis, Univ Fed Pernambuco, Brasil
- 12 Barros ECO, Webber AC, Machado IC (2013) Limitação de polinizadores e mecanismo de
13 autoincompatibilidade de ação tardia como causas da baixa formação de frutos em duas espécies
14 simpátricas de *Inga* (Fabaceae – Mimosoideae) na Amazônia Central. Rodriguésia 64:37–47.
15 <https://doi.org/10.1590/S2175-78602013000100005>
- 16 Barros MAG (2002) The synchronous flowering and the breeding systems of four species of
17 *Kielmeyera* Mart. (Guttiferae). Acta Bot Bras 16:113–122. <https://doi.org/10.1590/S0102-33062002000100013>
- 19 Barros MG (2001) Pollination ecology of *Tabebuia aurea* (Manso) Benth and Hook and *T.*
20 *ochracea* (Cham). Standl. (Bignoniaceae) in Central Brazil Cerrado vegetation. Rev Bras Bot
21 24:255–261. <https://doi.org/10.1590/S0100-84042001000300003>
- 22 Bawa KS, Bullock SH, Perry DR, Coville RE, Grayum MH (1985) Reproductive biology of
23 tropical lowland rainforest trees. II. Pollination systems. Am J Bot 72:346–356.
24 <https://doi.org/10.1002/j.1537-2197.1985.tb05358.x>

- 1 Bawa KS, Webb CJ (1984) Flower, fruit and seed abortion in tropical forest trees: Implications
2 for the evolution of paternal and maternal reproductive patterns. *Am J Bot* 71:736–751.
3 <https://doi.org/10.1002/j.1537-2197.1984.tb14181.x>
- 4 Bawa KS (1974) Breeding systems of tree species of a lowland tropical community. *Evolution*
5 28:85–92. <https://doi.org/10.2307/2407241>
- 6 Bittencourt NS Jr (2019) Reproductive systems and low outbreeding barriers between *Jacaranda*
7 *cuspidifolia* and *J. mimosifolia* (Jacarandaceae, Bignoniaceae). *Nord J Bot* 37.
8 <https://doi.org/10.1111/njb.02558>
- 9 Bittencourt NS Jr, Pereira EJ Jr, São-Thiago PS, Semir J (2011) The reproductive biology of
10 *Cybistax antisyphilitica* (Bignoniaceae), a characteristic tree of the South American savanna-like
11 “Cerrado” vegetation. *Flora* 206:872–886. <https://doi.org/10.1016/j.flora.2011.05.004>
- 12 Bittencourt NS Jr, Moraes CIG (2010) Self-fertility and polyembryony in South American yellow
13 trumpet trees (*Handroanthus chrysotrichus* and *H. ochraceus*, Bignoniaceae): A histological
14 study of post-pollination events. *Plant Syst Evol* 288:59–76. [https://doi.org/10.1007/s00606-010-](https://doi.org/10.1007/s00606-010-0313-2)
15 [0313-2](https://doi.org/10.1007/s00606-010-0313-2)
- 16 Bittencourt NS Jr, Semir J (2005) Late-acting self-incompatibility and other breeding systems in
17 *Tabebuia* (Bignoniaceae). *Int J Plant Sci* 166:493–506. <https://doi.org/10.1086/428758>
- 18 Bittencourt NS Jr, Semir J (2004) Pollination biology and breeding system of *Zeyheria montana*
19 (Bignoniaceae). *Plant Syst Evol* 247:241–254. <https://doi.org/10.1007/s00606-004-0142-2>
- 20 Borém RAT, Reis GH, Campos CCF (2009) Biologia reprodutiva de *Campomanesia pubescens*
21 Mart. (Myrtaceae) uma espécie arbustiva dos cerrados do Brasil e sua ocorrência no Parque
22 Ecológico Quedas do Rio Bonito. *Anais III Congr Lat Am Ecol, Brasil*.
- 23 Borges HBN (1991) Biologia reprodutiva de quatro espécies de Melastomataceae. Master
24 Dissertation, Univ Est Campinas, Brasil.

- 1 Borges LA, Machado IC, Lopes AV (2017) Bee pollination and evidence of substitutive nectary
2 in *Anadenanthera colubrina* (Leguminosae–Mimosoideae). *Arthropod-Plant Interact* 11:263–
3 271. <https://doi.org/10.1007/s11829-016-9493-1>
- 4 Bullock SH (1985) Breeding systems in the flora of a tropical deciduous forest in Mexico.
5 *Biotropica* 17:287–301. <https://doi.org/10.2307/2388591>
- 6 Campacci TVS, Castanho CT, Oliveira RLF, Suzuki RM, Catharino ELM (2017) Effects of
7 pollen origin on apomixis in *Zygopetalum mackayi* orchids. *Flora* 226:96–103.
8 <https://doi.org/10.1016/j.flora.2016.11.013>
- 9 Campos CCF, Duarte JF, Borém RAT, Castro DM (2009) Floral biology and breeding
10 mechanisms of *Tibouchina heteromalla* cong. in rocky outcrops in the south of Minas Gerais.
11 *Braz J Ecol* 1.
- 12 Carvalho DA, Oliveira PEAM (2003) Biologia reprodutiva e polinização de *Senna sylvestris*
13 (Vell.) I. and B. (Leguminosae, Caesalpinioideae). *Rev Bras Bot* 26:319–328.
14 <https://doi.org/10.1590/S>
- 15 Carvalho PER (2009) Cerejeira: *Eugenia involucrata*. Comunicado Técnico, Colombo, Brasil.
- 16 Chiapero AL, Aguilar R, Galfrascoli GM, Bernardello G, Quesada M, Ashworth L (2021)
17 Reproductive resilience to habitat fragmentation of *Lithraea molleoides* (Anacardiaceae), a
18 dominant dioecious tree from the Chaco Serrano. *For Ecol Manage* 492:119215.
19 <https://doi.org/10.1016/j.foreco.2021.119215>
- 20 Correia MCR, Pinheiro MCB, Lima HA (2006) Biologia floral e polinização de *Anemopaegma*
21 *chamberlaynii* Bur. & K.Schum. (Bignoniaceae). *Lundiana* 7: 39–46.
22 <https://doi.org/https://doi.org/10.35699/2675-5327.2006.22183>
- 23 Correia MCR, Pinheiro MCB, Lima HA (2005) The fruit set and the seed germination of
24 *Anemopaegma chamberlaynii* Bur. & K. Schum. (Bignoniaceae)- A register of polyembryony
25 *Sitientibus Ser Ci Bio* 5:68–71. <https://doi.org/10.13102/scb8216>

- 1 Correia MCR, Benevides CR, Lima HA (2011) Dois casos de poliembrião em Clusiaceae:
2 *Clusia criuva* Cambess, e *Clusia fluminensis* Planch. and Triana. *Hoehnea* 38:321–324.
3 <https://doi.org/10.1590/S2236-89062011000200012>
- 4 Costa CBN, Lambert SM, Borba EL, Paganucci PQ (2007) Post-zygotic reproductive isolation
5 between sympatric taxa in the *Chamaecrista desvauxii* complex (Leguminosae-
6 Caesalpinioideae). *Ann Bot* 99:625–635. <https://doi.org/10.1093/aob/mcm012>
- 7 Costa CCF, Krupek RA, Krawczyk ACDB (2015) Diversidade de visitantes florais e biologia
8 reprodutiva do araçá (*Psidium cattleianum* Sabine) em fragmento de mata e área urbana. *Bioikos*
9 29:11–18.
- 10 Costa RB, Contini AZ, Melo ESP (2003) Sistema reprodutivo de *Anadenanthera peregrina* (L.)
11 Speg e *Vochysia haenkiana* (Spreng.) Mart. em fragmento de cerrado na Chapada dos Guimarães
12 – MT. *Cienc Rural* 33:305–310. <https://doi.org/10.1590/S0103-84782003000200019>
- 13 Crestana CSM (1995) Ecologia da polinização de *Genipa americana* L. (Rubiaceae) na Estação
14 Ecológica de Moji Guaçu, estado de São Paulo. *Rev Inst Florest* 7:169–195.
15 <https://doi.org/10.24278/2178-5031.199572705>
- 16 Cruz ON (2007) Fenologia, biologia reprodutiva e eficiência dos visitantes florais de espécies
17 simpátricas de Inga (Leguminosae–Mimosoideae) em remanescente de Floresta Atlântica do
18 nordeste do Brasil. Master Dissertation, Univ Fed Pernambuco, Brasil.
- 19 Custodio T, Comtois P, Araujo AC (2017) Reproductive biology and pollination ecology of
20 *Triplaris gardneriana* (Polygonaceae): A case of ambophily in the Brazilian Chaco. *Plant Biol*
21 19:504–514. <https://doi.org/10.1111/plb.12554>
- 22 Darrault RO, Schlindwein C (2005) Limited fruit production in *Hancornia speciosa*
23 (Apocynaceae) and pollination by nocturnal and diurnal insects. *Biotropica* 37:381–388.
24 <https://doi.org/10.1111/j.1744-7429.2005.00050.x>
- 25 Duncan EJ (1970) Ovule and embryo ontogenesis in *Bombacopsis glabra* (Pasq.) A. Robyns.
26 *Ann Bot* 34:677–683. <https://doi.org/10.1093/oxfordjournals.aob.a084401>

- 1 Dutra JCS, Machado VLL (2001) Entomofauna visitante de *Stenolobium stans* (Juss.) Seem
2 (Bignoniaceae), durante seu período de floração. Neotrop Entomol 30:43–53.
3 <https://doi.org/10.1590/S1519-566X2001000100008>
- 4 Faria JMR, van Lammeren AAM, Hilhorst HWM (2004) Desiccation sensitivity and cell cycle
5 aspects in seeds of *Inga vera* subsp. *affinis*. Seed Sci Res 14:165–178.
6 <https://doi.org/10.1079/SSR2004166>
- 7 Firetti-Leggieri F, Lohmann LG, Alcantara S, Costa IR, Semir J (2013) Polyploidy and
8 polyembryony in *Anemopaegma* (Bignoniaceae, Bignoniaceae). Plant Reprod 26:43–53.
9 <https://doi.org/10.1007/s00497-012-0206-3>
- 10 Fracasso CM, Sazima M (2004) Pollination of *Cambessedesia hilariana* (Kunth) DC.
11 (Melastomataceae): Reproductive success versus bee diversity, behaviour and frequency of visits.
12 Rev Bras Bot 27:797–804. <https://doi.org/10.1590/S0100-84042004000400018>
- 13 Franco AM, Goldenberg R, Varassin IG (2011) Pollinator guild organization and its
14 consequences for reproduction in three synchronopatric species of *Tibouchina*
15 (Melastomataceae). Rev Bras Entomol 55:381–388. <https://doi.org/10.1590/S0085-56262011005000040>
- 17 Freitas CV, Oliveira PE (2002) Biologia reprodutiva de *Copaifera langsdorffii* Desf.
18 (Leguminosae, Caesalpinioideae). Rev Bras Bot 25:311–321. <https://doi.org/10.1590/S0100-84042002000300007>
- 20 Gandolphi G, Bittencourt NS Jr (2010) Sistema reprodutivo do Ipê-Branco - *Tabebuia roseo-alba*
21 (Ridley) Sandwith (Bignoniaceae). Acta Bot Bras 24:840–851. <https://doi.org/10.1590/S0102-33062010000300026>
- 23 Gibbs PE, Bianchi MB (1999) Does late-acting self-incompatibility (LSI) show family
24 clustering? Two more species of Bignoniaceae with LSI: *Dolichanadra cynanchoides* and
25 *Tabebuia nodosa*. Ann Bot 84:449–457. <https://doi.org/10.1006/anbo.1999.0933>

- 1 Gibbs PE, Bianchi MB (1993) Post-pollination events in species of *Chorisia* (Bombacaceae) and
2 *Tabebuia* (Bignoniaceae) with late-acting self-incompatibility. Bot Acta 106:64–71.
3 <https://doi.org/10.1111/j.1438-8677.1993.tb00339.x>
- 4 Goldenberg R, Shepherd GJ (1998) Studies on the reproductive biology of Melastomataceae in
5 “Cerrado” vegetation. Plant Syst Evol 211:13–29. <https://doi.org/10.1007/BF00984909>
- 6 Guimarães PJF, Ranga NT (1997) Reproductive system of *Rhynchanthera dichotoma* (Lam.) DC.
7 Acta Bot Bras 11:41–44. <https://doi.org/10.1590/S0102-33061997000100004>
- 8 Gurgel JTA, Sobrinho JS (1951) Poliembryonia em Mirtáceas frutíferas. Bragantia 11:141–163.
9 <https://doi.org/10.1590/S0006-87051951000200006>
- 10 Hokche OD, Ramírez N (2008) Sistemas reproductivos en especies de Melastomataceae en la
11 gran sabana (Estado Bolívar, Venezuela). Acta Bot Venez 31:387–408.
- 12 Hufford KM, Hamrick JL (2003) Viability selection at three early life stages of the tropical tree,
13 *Platypodium elegans* (Fabaceae, Papilionoideae). Evolution 57:518–526.
14 <https://doi.org/10.1111/j.0014-3820.2003.tb01543.x>
- 15 Kiill LHP, Martins CT, Silva PP (2010) Biologia reprodutiva de duas espécies de Anacardiaceae
16 da caatinga ameaçadas de extinção. In: Albuquerque, U. P., Moura, E. L., and Araújo, E. L.
17 (Eds.), Biodiversidade, potencial econômico e processos eco-fisiológicos em ecossistemas
18 nordestinos, Brasil.
- 19 Lenza E, Ferreira JN, Consolaro H, Aquino FG (2008) Biologia reprodutiva de *Rourea induta*
20 Planch. (Connaraceae), uma espécie heterostílica de cerrado do Brasil Central. Rev Bras Bot 31:
21 389–398.
- 22 Lenza E, Oliveira PEAM (2006) Biologia reprodutiva e fenologia de *Virola sebifera* Aubl.
23 (Myristicaceae) em mata mesofítica de Uberlândia, MG, Brasil. Rev Bras Bot 29: 443–451.
- 24 Lenza E, Oliveira PEAM (2005) Biologia reprodutiva de *Tapirira guianensis* Aubl.
25 (Anacardiaceae), uma espécie dióica, em mata de galeria do Triângulo Mineiro. Rev Bras Bot 28:
26 179–190.

- 1 Lima DCR, Lima CF, Costa FO, Silva ALG (2014) Biologia reprodutiva de *Adenocalymma*
2 *pedunculatum* (Vell.) L. G. Lohmann (Bignoniaceae). *Pesqui Bot* 65: 273–291.
- 3 Lombello RA, Pinto-Maglio CAF (2004) Cytogenetics and reproductive biology of *Bixa orellana*
4 L. (Bixaceae). *Cytologia* 79: 379–386. <https://doi.org/10.1508/cytologia.79.379>
- 5 Machado IC, Lopes AV, Sazima M (2006) Plant sexual systems and a review of the breeding
6 system studies in the Caatinga, a Brazilian tropical dry forest. *Ann Bot* 97: 277–287.
7 <https://doi.org/10.1093/aob/mcj029>
- 8 Maia FR, Varassin IG, and Goldenberg R (2016) Apomixis does not affect visitation to flowers
9 of Melastomataceae, but pollen sterility does. *Plant Biol* 18: 132–138.
10 <https://doi.org/10.1111/plb.12364>
- 11 Maia FR (2013) Sistemas reprodutivos e visitantes florais em Melastomataceae dos campos
12 rupestres no limite Sul do cerrado, Tibagi, Paraná. Master Dissertation, Univ. Fed. Paraná, Brasil.
- 13 Matias R, Pérez-Barrales R, and Consolaro H (2020) Patterns of variation in distylous traits and
14 reproductive consequences in *Erythroxylum* species and populations. *Am J Bot* 107: 910–922.
15 <https://doi.org/10.1002/ajb2.1478>
- 16 Medeiros MB, Miranda HS (2008) Post-fire resprouting and mortality in Cerrado woody plant
17 species over a three-year period. *Edinb J Bot* 65: 53–68.
18 <https://doi.org/10.1017/S0960428608004708>
- 19 Melo GF, Machado IC, Luceno M (1999) Reprodución de tres especies de *Clidemia*
20 (Melastomataceae) en Brasil. *Rev Biol Trop* 47: 359–363. <https://doi.org/10.1111/plb.12364>
- 21 Mendes MG, Oliveira AP, Oliveira PE, Bonetti AM, Sampaio DS (2018) Sexual, apomictic and
22 mixed populations in *Handroanthus ochraceus* (Bignoniaceae) polyploid complex. *Plant Syst*
23 *Evol* 304: 817–829. <https://doi.org/10.1007/s00606-018-1512-5>
- 24 Mendes-Rodrigues C, Marinho RC, Balao F, Arista M, Ortiz PL, Carmo-Oliveira R, Oliveira P E
25 (2019) Reproductive diversity, polyploidy, and geographical parthenogenesis in two *Eriotheca*

- 1 (Malvaceae) species from Brazilian Cerrado. *Perspect Plant Ecol Evol Syst* 36: 1–12.
- 2 <https://doi.org/10.1016/j.ppees.2018.11.001>
- 3 Mendes-Rodrigues C, Oliveira PE (2012). Polyembryony in Melastomataceae from Brazilian
- 4 Cerrado: multiple embryos in a small world. *Plant Biol* 14: 845–853.
- 5 <https://doi.org/10.1111/j.1438-8677.2011.00551.x>
- 6 Mendes-Rodrigues C, Carmo-Oliveira R, Talavera S, Arista M, Ortiz PL, Oliveira PE (2005)
- 7 Polyembryony and apomixis in *Eriotheca pubescens* (Malvaceae – Bombacoideae). *Plant Biol* 7:
- 8 533–540. <https://doi.org/10.1590/2175-7860202273078>
- 9 Montesinos D, Oliveira P (2014). Reproductive ecology of buzz-pollinated *Ouratea spectabilis*
- 10 trees (Ochnaceae) in Brazilian Cerrados. *Web Ecol.*, 14, 79–84. [https://doi.org/10.5194/we-14-](https://doi.org/10.5194/we-14-79-2014)
- 11 [79-2014](https://doi.org/10.5194/we-14-79-2014)
- 12 Nasário JPS (2014) Biologia floral, reprodutiva e cariótipos de espécies de *Pseudobombax*.
- 13 Dugand (Bombacoideae, Malvaceae) do Sudeste do Brasil. Master Dissertation, Univ. Estadual
- 14 Campinas, Brasil. <https://doi.org/10.47749/T/UNICAMP.2014.922980>
- 15 Nucci M, Alves-Junior VV (2017) Biologia floral e sistema reprodutivo de *Campomanesia*
- 16 *adamantium* (Cambess.) O. Berg – Myrtaceae em área de cerrado no sul do Mato Grosso do Sul,
- 17 Brasil. *Interciencia* 42: 127–131.
- 18 Oliveira MIB, Sigrist MR (2008) Fenologia reprodutiva, polinização e reprodução de *Dipteryx*
- 19 *alata* Vogel (Leguminosae-Papilionoideae) em Mato Grosso do Sul, Brasil. *Rev Bras Bot* 31:
- 20 195–207. <https://doi.org/10.1590/S0100-84042008000200002>
- 21 Oliveira PE, Gibbs PE, Barbosa AAA (2004) Moth pollination of woody species in the Cerrados
- 22 of Central Brazil: A case of so much owed to so few? *Plant Syst Evol* 245: 41–54.
- 23 <https://doi.org/10.1007/s00606-003-0120-0>
- 24 Oliveira PE (1996) Dioecy in the Cerrado vegetation of Central Brazil. *Flora* 191: 235–243.
- 25 [https://doi.org/10.1016/S0367-2530\(17\)30718-1](https://doi.org/10.1016/S0367-2530(17)30718-1)

- 1 Oliveira PE, Silva JCS (1993) Reproductive biology of two species of *Kielmeyera* (Guttiferae) in
2 the Cerrados of Central Brazil. J Trop Ecol 9: 67–79.
3 <https://doi.org/10.1017/S0266467400006970>
- 4 Oliveira PE, Gibbs PE, Barbosa AAA, Talavera S (1992) Contrasting breeding systems in two
5 *Eriotheca* (Bombacaceae) species of the Brazilian cerrados. Plant Syst Evol 179: 207–219.
6 <https://doi.org/10.1007/BF00937597>
- 7 Oliveira PE (1991a) The pollination and reproductive biology of a Cerrado woody community in
8 Brazil. PhD thesis. Univ. St Andrews, Scotland.
- 9 Oliveira PE, Gibbs PE, Bianchi M (1991b) Pollination and breeding system of *Vellozia squamata*
10 (Liliales: Velloziaceae): A species of the Brazilian Cerrados. Bot Acta 104: 392–398.
11 <https://doi.org/10.1111/j.1438-8677.1991.tb00247.x>
- 12 Oliveira RC (1998) Estudos embriológicos e aspectos da morfologia floral em Vochysiaceae.
13 PhD thesis. Univ. São Paulo, Brasil.
- 14 Ortiz PLB, Arista M, Oliveira PEAM, Talavera S (2003) Patterns of flower and fruit production
15 in *Stryphnodendron adstringens*, an andromonoecious legume tree of Central Brazil. Plant Biol 5:
16 592–599. <https://doi.org/10.1055/s-2003-44720>
- 17 Pelacani MGN, Jesus ARG, Spina SM, Figueiredo RA (2000) Biologia floral da pitangueira
18 (*Eugenia uniflora* L., Myrtaceae). Rev Fac Educ Ciênc Letras Psicol Padre Anchieta 2: 17–20.
- 19 Pereira ZV (2007) Rubiaceae Juss. do Parque Estadual das Várzeas do Rio Ivinhema, Mato
20 Grosso do Sul: Florística, sistema reprodutivo, distribuição espacial e relações alométricas de
21 espécies distílicas. PhD thesis. Univ. Estadual Campinas, Brasil. [https://doi.org/10.1590/S2236-](https://doi.org/10.1590/S2236-89062013000200002)
22 [89062013000200002](https://doi.org/10.1590/S2236-89062013000200002)
- 23 Pinheiro MCB, Ormond WT, Castro AC (1991) Biologia da reprodução e fenologia de *Zizyphus*
24 *joazeiro* Mart. (Rhamnaceae). Rev Bras Biol 51: 143–152.
- 25 Proença CEB, Gibbs PE (1994) Reproductive biology of eight sympatric Myrtaceae from Central
26 Brazil. New Phytol 126: 343–354. <https://doi.org/10.1111/j.1469-8137.1994.tb03954.x>

- 1 Ramirez N, Brito Y (1990) Reproductive biology of a tropical palm swamp community in the
- 2 Venezuelan Llanos. Am J Bot 77: 1260–1271. <https://doi.org/10.1111/j.1469-137.1994.tb03954.x>
- 3 Resende K, Prado C, da Vide L, Torres G (2014). Polyploidy and apomixis in accessions of
- 4 *Senna rugosa* (G. Don) HS Irwin & Barneby. Tr. J. of Biology 38:510–515.
- 5
- 6