

**Family:** Lauraceae

**Taxon:** *Cinnamomum burmannii*

**Synonym:** *Cinnamomum mindanaense* Elmer  
*Laurus burmannii* Nees & T. Nees (basionym)

**Common Name:** Padang cassia  
Indonesian cassia

<b>Questionnaire :</b>	current 20090513	<b>Assessor:</b>	Chuck Chimera	<b>Designation:</b> H(HPWRA)
<b>Status:</b>	Assessor Approved	<b>Data Entry Person:</b>	Chuck Chimera	<b>WRA Score</b> 12
101	Is the species highly domesticated?		y=-3, n=0	n
102	Has the species become naturalized where grown?		y=1, n=-1	
103	Does the species have weedy races?		y=1, n=-1	
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"		(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data		(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)		y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates		y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?		y=-2, ?=-1, n=0	y
301	Naturalized beyond native range		y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed		n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed		n=0, y = 2*multiplier (see Appendix 2)	y
305	Congeneric weed		n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs		y=1, n=0	n
402	Allelopathic		y=1, n=0	n
403	Parasitic		y=1, n=0	n
404	Unpalatable to grazing animals		y=1, n=-1	
405	Toxic to animals		y=1, n=0	n
406	Host for recognized pests and pathogens		y=1, n=0	y
407	Causes allergies or is otherwise toxic to humans		y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle		y=1, n=0	y
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		y=1, n=0	
411	Climbing or smothering growth habit		y=1, n=0	n

412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	y
604	Self-compatible or apomictic	y=1, n=-1	
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m <sup>2</sup> )	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	n

Designation: H(HPWRA)

WRA Score 12

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**Supporting Data:**

101	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Is the species highly domesticated? No] No evidence
101	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Is the species highly domesticated? No] No evidence
102	2011. WRA Specialist. Personal Communication.	NA
103	2011. WRA Specialist. Personal Communication.	NA
201	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Species suited to tropical or subtropical climate(s) 2-high] "Native to Indonesia"
202	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Quality of climate match data 2-high] "Native to Indonesia"
203	1987. Roecklein, J.C./Leung, P. (eds.). A Profile of economic plants. Transaction Publishers, New Brunswick, NJ	[Broad climate suitability (environmental versatility)? Yes] "Trees are cultivated in western Sumatra, Java, and east to Timor at elevations from sea level to 2,000 m." [Elevation range exceeds 1000 m, demonstrating environmental versatility]
204	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Native or naturalized in regions with tropical or subtropical climates? Yes] "Native to Indonesia"
205	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Does the species have a history of repeated introductions outside its natural range? Yes] "Native to Indonesia, Padang cassia has long been cultivated in Hawaii and on the U.S. mainland, where it has been incorrectly called <i>C. cassis</i> Blume..."
301	1997. Meidell, J.S./Oppenheimer, H.L./Bartlett, R.T.. New plant records from Pu'u Kukui watershed and adjacent areas, Maui. Bishop Museum Occasional Papers. 49: 17-18.	[Naturalized beyond native range? Yes] "Wagner et al. (1990:846) document the naturalized range as O'ahu. Introduced to northern West Maui c. 1920–1935, <i>C. burmannii</i> has become extensively naturalized in the area between Honokohau and Honokahua Valleys, 245m–610 m, and is viewed by Pu'u Kukui Watershed Management staff as a serious pest. The number of individuals is estimated to be in the thousands, with current eradication efforts focused on satellite populations. Material examined. MAUI: Lahaina District - West Maui, 396 m, ridge between Honolua and Honokahua Valleys, 20 October 1996, Meidell & Oppenheimer 128 (BISH)."
301	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Naturalized beyond native range? Yes] "cultivated on O'ahu, where it has become naturalized at least in Manoa Valley and Pauoa Flats. First naturalized collection made in 1975 (Baker 99, BISH), but cultivated in Hawaii during most of this century."
301	2000. Horcher, A.T.. Stand dynamics of <i>Cinnamomum burmannii</i> , an invasive tree, on Oahu, Hawaii. University of Montana, Missoula, MT	[Naturalized beyond native range? Yes]
301	2003. Starr, F./Starr, K./Loope, L.L.. <i>Cinnamomum burmannii</i> - Padang cassia - Lauraceae. USGS - Biological Resources Haleakala Field Station Maui, <a href="http://www.hear.org/starr/hiplants/reports/pdf/cinnamomum_burmannii.pdf">http://www.hear.org/starr/hiplants/reports/pdf/cinnamomum_burmannii.pdf</a>	[Naturalized beyond native range? Yes] "On East Maui, there are a few locations where <i>C. burmannii</i> is naturalized, also in moist to wet disturbed forested areas nearby original plantings, though these infestations are not yet as dense or widespread as West Maui."
301	2004. Starr, F./Starr, K./Loope, Lloyd L.. New plant records from the Hawaiian Archipelago. Bishop Museum Occasional Papers. 79: 20-30.	[Naturalized beyond native range? Yes] "Previously known from O'ahu, Maui, and Hawai'i (Wagner et al., 1990; Wagner & Herbst, 1995; Wagner et al., 1997; Meidell et al., 1997), <i>C. burmannii</i> is also growing wild on Kaua'i in mesic forest near Limahuli Garden on the north shore. This collection represents a new island record for Kaua'i. Material examined: KAUA'I: Hanalei, growing in disturbed forest with <i>Schefflera actinophylla</i> , <i>Ficus microcarpa</i> , and <i>Syzygium cumini</i> , 30 ft [9 m], 25 Feb 2002, Starr & Starr 020225-6."
302	2011. WRA Specialist. Personal Communication.	[Garden/amenity/disturbance weed? No] Environmental weed [See 3.04]

303	2007. Randall, R.P.. Global Compendium of Weeds - <i>Cinnamomum burmannii</i> [Online Database]. <a href="http://www.hear.org/gcw/species/cinnamomum_burmannii/">http://www.hear.org/gcw/species/cinnamomum_burmannii/</a>	[Agricultural/forestry/horticultural weed? No] No evidence
304	1997. Meidell, J.S./Oppenheimer, H.L./Bartlett, R.T.. New plant records from Pu'u Kukui watershed and adjacent areas, Maui. Bishop Museum Occasional Papers. 49: 17-18.	[Environmental weed? Yes] "Introduced to northern West Maui c. 1920–1935, <i>C. burmannii</i> has become extensively naturalized in the area between Honokohau and Honokahua Valleys, 245m–610 m, and is viewed by Pu'u Kukui Watershed Management staff as a serious pest. The number of individuals is estimated to be in the thousands, with current eradication efforts focused on satellite populations."
305	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Congeneric weed? Yes] " <i>Cinnamomum camphora</i> ...The tree has an excellent adaptation to disturbed sites and easily becomes naturalized where planted. It produces fruits abundantly and is able to reproduce vegetatively by root suckering. The tree forms single-dominant stands that delay or preclude native rainforest regeneration."
401	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Produces spines, thorns or burrs? No] "Trees; young branches terete, glabrous. Leaves glossy green, alternate, often opposite at tips of young branches, narrowly ovate to ovate, ca. 10 cm long, 3-4 cm wide, tripliveined, glabrous, apex gradually acute. "
402	2004. Ravindran, P.N./Nirmal Babu, K./Shylaja, M. (eds.). Cinnamon and cassia: the genus <i>Cinnamomum</i> . CRC Press, Boca Raton, FL	[Allelopathic? No] No evidenced
402	2006. Daehler, C. C./Baker, R. F.. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, O'ahu. Bishop Museum Occasional Papers. 87: 3-18.	[Allelopathic? No] "However, at least a dozen young trees 2–5 m tall were observed far from planted specimens in unmanaged areas around the Arboretum, including in <i>Cinnamomum burmannii</i> forest, <i>Ardisia elliptica</i> forest, and even in a dense bamboo thicket." [No evidence, and does not suppress growth of <i>Elaeocarpus angustifolius</i> ]
403	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Parasitic? No] "Trees; young branches terete, glabrous."
404	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Unpalatable to grazing animals? Unknown] " <i>Cinnamomum camphora</i> ... Control of this tree on cultivated ground has relied on intensive grazing." [Related species apparently palatable, but unknown for <i>C. burmannii</i> ]
404	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Unpalatable to grazing animals? Unknown] "The leafy branchlets contain volatile oil. Three types of the oil are found in Yunnan: linalol type (linalol ca. 57%), citral type (citral ca. 77%), and cineole type (cineole ca. 47%)." [Volatile oils may make foliage unpalatable. No information found on browsing or grazing animals consuming this species]
404	2010. Sardans, J./Llusà, J./Niinemets, Ü./Owen, S./Peñuelas, J.. Foliar Mono- and Sesquiterpene Contents in Relation to Leaf Economic Spectrum in Native and Alien Species in Oahu (Hawai'i). <i>Journal of Chemical Ecology</i> . 36: 210–226.	[Unpalatable to grazing animals? Possibly Yes] "Abstract Capacity for terpene production may confer advantage in protection against abiotic stresses such as heat and drought, and also against herbivore and pathogen attack. Plant invasive success has been intense in the Hawaiian islands, but little is known about terpene content in native and alien plant species on these islands...Comparing alien and native species, the results also support the modified Evolution of Increased Competitive Ability (EICA) hypothesis that suggests that alien success may be favored by a defense system based on an increase in concentrations of less costly defenses (terpenes) against generalist herbivores...Five of the 17 alien species that accumulated several mono- and sesquiterpenes, <i>Cinnamomum burmannii</i> , <i>Eucalyptus robusta</i> , <i>Psidium cattleianum</i> , <i>Rubus rosifolius</i> , and <i>Syzygium cumini</i> (Tables 2–3) had not yet been reported as terpene-accumulator species, although members of the same genus have been described as terpene accumulators..." [Contains terpenes that may discourage herbivory]
405	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Toxic to animals? No] No evidence
405	2010. Sardans, J./Llusà, J./Niinemets, Ü./Owen, S./Peñuelas, J.. Foliar Mono- and Sesquiterpene Contents in Relation to Leaf Economic Spectrum in Native and Alien Species in Oahu (Hawai'i). <i>Journal of Chemical Ecology</i> . 36: 210–226.	[Toxic to animals? No] No evidence

406	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	<p>[Host for recognized pests and pathogens? Yes] Pests recorded</p> <p>Insects: Pachnoda interrupta (chafer beetle)</p> <p>Pests recorded at the generic level (Cinnamomum): Insects: Aleurodicus destructor (coconut whitefly) Ceroplastes rubens (red wax scale) Coccus hesperidum (brown soft scale) Cricula trifenestrata (tea flush worm) Diaspidiotus perniciosus (San José scale) Heliothrips haemorrhoidalis (black tea thrips) Icerya seychellarum (Seychelles scale) Orgyia postica (cocoa tussock moth) Parasaissetia nigra (pomegranate scale) Pseudaulacaspis pentagona (mulberry scale) Xylosandrus ater Xylotrupes gideon</p> <p>Nematodes: Criconemella (ring nematode)</p> <p>Fungus diseases: Armillaria tabescens (armillaria root rot) Corticium salmonicolor (damping off)</p> <p>Pests recorded at the family level (Lauraceae): Insects: Aleurodicus pulvinatus (coconut whitefly)</p>
406	2010. Keen, B./Vancov, T.. Phytophthora cinnamomi suppressive soils. Pp 239-250 in A. Mendez-Vilas (Ed.) Current Research, Technology & Education Topics in Applied Microbiology & Microbial Biotechnology. Formatex Research Center, Badajoz, Spain	<p>[Host for recognized pests and pathogens? Yes] "Phytophthora cinnamomi (Fig. 1) is a soil and water-borne Oomycete first described by Rands in 1922 [1] as the causal agent of stripe canker in Cinnamomum burmannii (cinnamon tree). Phylogenetic studies indicate that P. cinnamomi most likely originated from across a wide area within New Guinea-Malaysia-Celebes and has been introduced to all other parts of the world where it exists [2]. Renowned as one of the most ubiquitous, invasive and destructive plant pathogens, P. cinnamomi has a host range exceeding 1000 plant species and has spread to every continent except Antarctica [3]. The pathogen mainly infects the roots of its host causing root rot and without treatment the host usually dies. To destructive potential of P. cinnamomi is amply demonstrated by the decimation of an estimated 202,500 ha of the jarrah forests (Eucalyptus marginata) of Western Australia between 1927 and 1986 [4]."</p>
407	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	<p>[Causes allergies or is otherwise toxic to humans? No] "The dried bark is a source of an important spice, which is used as a substitute for cassia bark. The wood is heavy, soft, finely grained, and used for house construction. The leafy branchlets contain volatile oil. Three types of the oil are found in Yunnan: linalol type (linalol ca. 57%), citral type (citral ca. 77%), and cineole type (cineole ca. 47%)."</p>
408	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	<p>[Creates a fire hazard in natural ecosystems? No] "Sparse or dense forests and thickets, roadsides along streams; 100–1400 m (to 2100 m in Yunnan). Fujian, Guangdong, Guangxi, Hainan, Yunnan [India, Indonesia, Myanmar, Philippines, Vietnam]." [No evidence]</p>

408	2011. Xiao, J.-X./Huang, Y.-Z./Li, D./ Zhang, L.-P./Liu, X.-P./Ye, Q.. A Study on Fire-resistance of Mountain Tree Species in Jiangxi. Acta Agriculturae Universitatis Jiangxiensis. DOI: CNKI:SUN:JXND.0.2011-01-016: .	[Creates a fire hazard in natural ecosystems? No] "Twenty-eight mountain tree species from the western suburbs and the northern suburbs of Nanchang were harvested to determine the physical and chemical properties of different organs, for combustion and fire resistance test.17 factors, namely moisture content, ignition temperature, heat value, ash content, crude fat content, lignin content, crude fiber content, burning time, burning intensity, bark thickness,the remaining rate of the bark quality and the heating rate of the inner bark surface under thermal radiation,and biological and ecological characteristics and so on,were chosen as the evaluation indexes, by using grey relational analysis a comprehensive evaluation of fire resistance of twenty-eight mountain tree species was conducted. Of the 28 species, five were of strongest fire-resistance, they were Symplocos setchuancensis Brand, Ilex purpurea Hassk., Michelia macclurel, Schima superba Gardn.et Champ.,and Cinnamomum camphora(L.) presl in order. Nine species were of relatively strong fire-resistance, they were Camptotheca acuminata Decne.,Cinnamomum burmannii, Cinnamomum Camphora (Linn) Presd,Castanopsis sclerophylla (Lindl.) Schott., Liriodendron chinense (Hemsl.) Sarg., Elaeocarpus sylvestris (Lour.) Pior, Thea Oleosa Lour. (Camellia oleifera Abel.), Ternstroemia gymnanthera (Wight et Arn.) Sprague, Lithocarpus glaber (Thunb.) Nakai in order. Populus Canadensis Moench., Paulownia fortunei Hemsl.,and Sabina chinensis (Linn.) Ant.were of common fire-resistance Phyllostachys pubescens, Sabina chinensis cv. kaizuka, Pinus massoniana Lamb., Cunninghamia lanceolata (Lamb.) Hook., Pinus elliotii Engelm were of relatively weak fire resistance. Six species, namely (Acer fabri Hance., Cryptomeria fortunei Hooibrenk ex Otto et Dietr., Cedrus deodara (Roxb.) G.Don., Metasequoia glyptostroboides Hu et cheng, Podocarpus macrophyllus (Thunb.) D.Don, Pseuxdolarix kaempferi (Lindl) Gord.) were of poor fire resistance."
409	2003. Starr, F./Starr, K./Loope, L.L.. Cinnamomum burmannii - Padang cassia - Lauraceae. USGS - Biological Resources Haleakala Field Station Maui, <a href="http://www.hear.org/starr/hiplants/reports/pdf/cinnamomum_burmannii.pdf">http://www.hear.org/starr/hiplants/reports/pdf/cinnamomum_burmannii.pdf</a>	[Is a shade tolerant plant at some stage of its life cycle? Yes] "C. burmannii naturalizes in moist and wet forests and may be difficult to control (PIER 2002). In Hawai'i, C. burmannii is considered a serious pest on West Maui by Pu'u Kukui Watershed staff (Meidell et al. 1997). Originally planted about 1920-1935, C. burmannii now numbers in the thousands in the areas of Honokohau and Honokahua Valleys (Meidell et al. 1997). It forms dense monotypic stands with exceptional seedling recruitment, even in low light environments."
410	2004. Ravindran, P.N./Nirmal Babu, K./Shylaja, M. (eds.). Cinnamon and cassia: the genus Cinnamomum. CRC Press, Boca Raton, FL	[Tolerates a wide range of soil conditions? Possibly yes] "Light, rich sandy loam is best suited for the cultivation of Indonesian cinnamon for the production of high quality bark. Growth is reported to be good in andosol, latosol and organosol soil types (Siswoputranto, 1976). But many small holders' plantations are on steep hillsides where the soil is stony, lateritic and less suitable for the production of high quality bark."
411	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Climbing or smothering growth habit? No] "Trees; young branches terete, glabrous."
412	2003. Starr, F./Starr, K./Loope, L.L.. Cinnamomum burmannii - Padang cassia - Lauraceae. USGS - Biological Resources Haleakala Field Station Maui, <a href="http://www.hear.org/starr/hiplants/reports/pdf/cinnamomum_burmannii.pdf">http://www.hear.org/starr/hiplants/reports/pdf/cinnamomum_burmannii.pdf</a>	[Forms dense thickets? Yes] "On West Maui, dense infestations occur in moist to wet forested areas nearby original plantings from sea level up to about 2,000 ft (610 m)...Trees were originally planted in the Maunalei Arboretum and now form monotypic stands with carpets of seedlings in disturbed areas nearby."
501	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Aquatic? No] "Trees; young branches terete, glabrous."
502	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Grass? No] Lauraceae
503	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Nitrogen fixing woody plant? No] Lauraceae
504	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Trees, up to 14 m tall, to 30 cm d.b.h."

601	2004. Ravindran, P.N./Nirmal Babu, K./Shylaja, M. (eds.). Cinnamon and cassia: the genus <i>Cinnamomum</i> . CRC Press, Boca Raton, FL	[Evidence of substantial reproductive failure in native habitat? No] No evidence
602	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Produces viable seed? Yes] "Padang cassia is usually propagated by seed, although 3-4" semiwoody cuttings may be successful."
602	2010. Chimera, C.G./Drake, D.R.. Effects of pulp removal on seed germination of five invasive plants in Hawaii. <i>Plant Protection Quarterly</i> . 25(3): 137-140.	[Produces viable seed? Yes] "As part of the processing of fleshy fruits, many frugivores remove pulp from seeds by external handling or internal processing in the digestive system. External processing was simulated for five fleshy-fruited, non-native invasive trees in Hawaii through manual removal of pulp from seeds. Species used were coralberry ( <i>Ardisia crenata</i> ), green cestrum ( <i>Cestrum nocturnum</i> ), Padang cassia ( <i>Cinnamomum burmannii</i> ), fiddlewood ( <i>Citharexylum caudatum</i> ) and Brazilian peppertree ( <i>Schinus terebinthifolius</i> ). Depulping of fruits significantly increased seed germination over all species. Mean germination of de-pulped fruits of coralberry, green cestrum, Padang cassia, fiddlewood, and Brazilian peppertree was, on average 72, 37, 47, 18 and 17% greater compared with pulped fruits. In general, de-pulped fruits germinate faster compared with pulped fruits. Mean germination rate index (50%) for coralberry, green cestrum, Padang cassia, and Brazilian peppertree was faster by 26.7, 64.1, 19.5 and 44.3% compared with pulped fruits. The germination rate of de-pulped fruits of fiddlewood was slower by 4% compared with pulped fruits. These results suggest that frugivores may facilitate establishment of fleshy-fruited invasive plants not only through dispersal, but also through seed processing that ultimately enhances seed germination and reduces germination time."
603	2010. Lee, S.-C./Lee, C.-H./Lin, M.-Y./Ho, K.-Y.. Genetic Identification of <i>Cinnamomum</i> Species Based on Partial Internal Transcribed Spacer 2 of Ribosomal DNA. <i>Journal of Food and Drug Analysis</i> . 18(4): 225-231.	[Hybridizes naturally? Yes] "The <i>C. burmannii</i> plant resembles Taiwan's indigenous <i>C. osmophloeum</i> . <i>C. burmannii</i> and <i>C. osmophloeum</i> are often mistaken for one another due to variations in their appearances caused by natural hybridization of the two species. Both species are frequently misidentified during traditional morphological identification(20). The need for genetic identification of <i>C. osmophloeum</i> or related species has increased recently."
604	2004. Ravindran, P.N./Nirmal Babu, K./Shylaja, M. (eds.). Cinnamon and cassia: the genus <i>Cinnamomum</i> . CRC Press, Boca Raton, FL	[Self-compatible or apomictic? Possibly No] "On any day both stage one and two flowers occurred randomly in a population of trees, and functionally female and functionally male flowers 9femal and male phases) would appear both in the morning and at noon. Thus the flowers of cinnamon is highly adapted to cross-pollination..."
605	1994. Zomlefer, W.B.. Guide to Flowering Plant Families. The University of North Carolina Press, Chapel Hill & London	[Requires specialist pollinators? No] "Insects (often flies) are attracted to glandular outgrowths that usually occur on the filaments of the third whorl..." [Family description]
605	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Requires specialist pollinators? No] "Flowers green-white, ca. 5 mm. Perianth densely gray puberulent outside and inside; perianth tube short, obconical, ca. 2 mm; perianth lobes oblong-ovate, acute. Fertile stamens 9, ca. 2.5 mm (of 1st and 2nd whorls) or ca. 2.7 mm (of 3rd whorl); filaments puberulent, those of 3rd whorl each with 2 sessile globose glands, others glandless; anthers oblong, 4-celled; cells introrse (of 1st and 2nd whorls) or extrorse (of 3rd whorl). Staminodes 3, narrowly triangular, ca. 1 mm, stalked; stalk ca. 0.7 mm, puberulent. Ovary subglobose, ca. 1.5 mm, somewhat puberulent; style ca. 2 mm, angled, somewhat puberulent; stigma discoid." [Not likely, based on floral morphology]
606	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Reproduction by vegetative fragmentation? No] "Padang cassia is usually propagated by seed, although 3-4" semiwoody cuttings may be successful." [No evidence]
607	2011. WRA Specialist. Personal Communication.	[Minimum generative time (years)? Unknown] Other <i>Cinnamomum</i> species flower or fruit in 3-5 years
701	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Propagules likely to be dispersed unintentionally? No] "Fruit ovoid, ca. 8 × 5 mm; perianth cup in fruit ca. 4 mm, apex ca. 3 mm wide, dentate, teeth truncate." [No means of external attachment]
702	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Propagules dispersed intentionally by people? Yes] "Padang cassia is used here as a street tree, and its lovely reddish emerging leaves are attractive against the deeper green of the mature foliage. It has also been planted as a reforestation tree and has become naturalized in several wet valleys on Oahu."

703	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Propagules likely to disperse as a produce contaminant? No] "Fruit ovoid, ca. 8 × 5 mm; perianth cup in fruit ca. 4 mm, apex ca. 3 mm wide, dentate, teeth truncate." [No evidence, and unlikely given the relatively large fruit & seeds]
704	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Propagules adapted to wind dispersal? No] "Fruit ovoid, ca. 8 × 5 mm; perianth cup in fruit ca. 4 mm, apex ca. 3 mm wide, dentate, teeth truncate."
705	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Propagules water dispersed? Unknown] "Sparse or dense forests and thickets, roadsides along streams; 100–1400 m (to 2100 m in Yunnan)." [Although not specifically adapted for water dispersal, the distribution along streams within its native range suggests that fruits and seeds may be dispersed by water at times]
706	2000. Laughlin, S.E.. Avian seed dispersal of <i>Cinnamomum burmannii</i> in Nuuanu Valley, O'ahu, Hawaii and its implications for alien species invasions. M.A. Thesis. University of Montana, Missoula, MT	[Propagules bird dispersed? Yes] On Oahu, Laughlin (2000) documented six non native bird species consuming fruits of <i>C. burmannii</i> , including both species of Bulbul, the Japanese White-eye, the Spotted Dove ( <i>Streptopelia chinensis</i> ), the Common Myna, and the Red-billed Leiothrix ( <i>Leiothrix lutea</i> ).
707	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Propagules dispersed by other animals (externally)? No] "Fruit ovoid, ca. 8 × 5 mm; perianth cup in fruit ca. 4 mm, apex ca. 3 mm wide, dentate, teeth truncate." [No means of external attachment]
708	2000. Laughlin, S.E.. Avian seed dispersal of <i>Cinnamomum burmannii</i> in Nuuanu Valley, O'ahu, Hawaii and its implications for alien species invasions. M.A. Thesis. University of Montana, Missoula, MT	[Propagules survive passage through the gut? Yes] On Oahu, Laughlin (2000) documented six non native bird species consuming fruits of <i>C. burmannii</i> , including both species of Bulbul, the Japanese White-eye, the Spotted Dove ( <i>Streptopelia chinensis</i> ), the Common Myna, and the Red-billed Leiothrix ( <i>Leiothrix lutea</i> ). [Fleshy-fruited, presumably adapted to survive gut passage]
801	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Prolific seed production (>1000/m <sup>2</sup> )? Probably No] "Trees, up to 14 m tall, to 30 cm d.b.h...Fruit ovoid, ca. 8 × 5 mm; perianth cup in fruit ca. 4 mm, apex ca. 3 mm wide, dentate, teeth truncate." [1-seeded fruits are relatively large and unlikely to achieve such high densities]
802	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Evidence that a persistent propagule bank is formed (>1 yr)? Unknown] " <i>Cinnamomum camphora</i> ...The tree does not accumulate a persistent seed bank." [Unknown for <i>C. burmannii</i> ]
802	2008. Royal Botanic Gardens Kew. Seed Information Database (SID). Version 7.1. <a href="http://data.kew.org/sid/">http://data.kew.org/sid/</a>	[Evidence that a persistent propagule bank is formed (>1 yr)? Unknown]
803	2003. Motooka, P./Castro, L./Nelson, D./Nagai, G./Ching,L.. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI <a href="http://www.ctahr.hawaii.edu/invweed/weedsHi.htm">http://www.ctahr.hawaii.edu/invweed/weedsHi.htm</a>	[Well controlled by herbicides? Yes] "Management: May be difficult to control. Susceptible to injected imazapyr or undiluted triclopyr amine applied to frills (Hank Oppenheimer, Maui Pine)."
803	2003. Starr, F./Starr, K./Loope, L.L.. <i>Cinnamomum burmannii</i> - Padang cassia - Lauraceae. USGS - Biological Resources Haleakala Field Station Maui, <a href="http://www.hear.org/starr/hiplants/reports/pdf/cinnamomum_burmannii.pdf">http://www.hear.org/starr/hiplants/reports/pdf/cinnamomum_burmannii.pdf</a>	[Well controlled by herbicides? Yes] "According to the Army Natural Resources staff on O'ahu, herbicide trials revealed that a cut stump method using Garlon 3A at concentrations higher than 1% was the most effective in controlling <i>C. burmannii</i> of all size classes. Other methods using 100% Garlon 3A including frill, drill, and EZJECT resulted in less effective kill, especially in larger trees."
804	2008. MobileReference. The Illustrated Encyclopedia of Trees and Shrubs: An Essential Guide To Trees and Shrubs of the World.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Possibly] "Cinnamon is harvested by growing the tree for two years and then coppicing it. The next year about a dozen shoots will form from the roots." [Refers to cultivation of <i>C. zeylanicum</i> . Unknown if <i>C. burmannii</i> is also able to coppice]
805	1997. Meidell, J.S./Oppenheimer, H.L./Bartlett, R.T.. New plant records from Pu'u Kukui watershed and adjacent areas, Maui. Bishop Museum Occasional Papers. 49: 17-18.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Presumably No] " <i>C. burmannii</i> has become extensively naturalized in the area between Honokohau and Honokahua Valleys, 245m–610 m, and is viewed by Pu'u Kukui Watershed Management staff as a serious pest. The number of individuals is estimated to be in the thousands..."