

Taxon: <i>Ficus macrophylla</i> Pers.	Family: Moraceae
Common Name(s): Australian banyan black fig Moreton Bay fig	Synonym(s): <i>Ficus magnolioides</i> Borzi

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 15 Oct 2019
WRA Score: 9.0	Designation: H(Hawai'i)	Rating: High Risk

Keywords: Strangler Fig, Naturalized, Environmental Weed, Bird-Dispersed, Resprouts

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
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	n
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		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
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		
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

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	y
412	Forms dense thickets		
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	n
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	y
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)		
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	n
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 ²)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Boland, D.J. , Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A., McDonald, M.W. & Turner, J.D. 2006. Forest Trees of Australia. CSIRO Publishing, Collingwood, Australia	[No evidence of domestication] "This species occurs from the isolated Mt Dromedary population near Narooma, New South Wales, in the south, to near Brisbane in the north. The main southern stands of the species occur in the Illawarra district, New South Wales, such as around Kangaroo Valley, Minnamurra Falls and Kiama. In the northern part of the State it is found in most forests from Wingham to the Tweed River. In Queensland it is common in the southern forests and around Moreton Bay, and as far west as the Bunya Mountains."
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	NA
103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	NA
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	Boland, D.J. , Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A., McDonald, M.W. & Turner, J.D. 2006. Forest Trees of Australia. CSIRO Publishing, Collingwood, Australia	"Moreton Bay fig typically occurs in subtropical (complex notophyll vine forests) but also occurs in warm temperate rainforests (simple notophyll vine forests) and
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 13 Oct 2019]	"Native Australasia AUSTRALIA: Australia [New South Wales (e.), Queensland (e.), Lord Howe Island]"
202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 13 Oct 2019]	
203	Broad climate suitability (environmental versatility)	n

Qsn #	Question	Answer
	Source(s)	Notes
	Boland, D.J. , Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A., McDonald, M.W. & Turner, J.D. 2006. Forest Trees of Australia. CSIRO Publishing, Collingwood, Australia	"Climate: Altitudinal range: near sea level to 900 m; Hottest/ coldest months: 25–30°C/5–10°C; Frost incidence: mainly low but upland sites receive 1–2 per year; Rainfall: 1000–1700 mm per year, summer max."
	SelecTree. "Ficus macrophylla Tree Record." 1995-2019. Oct 14, 2019. https://selectree.calpoly.edu/tree-detail/ficus-macrophylla . [Accessed 14 Oct 2019]	"USDA Hardiness Zones 9 - 11"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Starr, F., Starr, K.& Loope, L.L. (2010). New plant records from the Hawaiian Archipelago. Bishop Museum Occasional Papers 107: 61-68	"Ficus macrophylla (Moreton Bay fig) was previously reported from Moloka'i, Maui, and Hawai'i (Oppenheimer & Bartlett 2000; Starr et al. 2002; Oppenheimer 2006). on Midway Atoll, Moreton Bay fig was first collected in 1980 (Herbst & Takeuchi 6331, BISH). It was also collected in 1999 during a botanical survey (Starr & Martz 1999)."
	Boland, D.J. , Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A., McDonald, M.W. & Turner, J.D. 2006. Forest Trees of Australia. CSIRO Publishing, Collingwood, Australia	"This species occurs from the isolated Mt Dromedary population near Narooma, New South Wales, in the south, to near Brisbane in the north. The main southern stands of the species occur in the Illawarra district, New South Wales, such as around Kangaroo Valley, Minnamurra Falls and Kiama. In the northern part of the State it is found in most forests from Wingham to the Tweed River. In Queensland it is common in the southern forests and around Moreton Bay, and as far west as the Bunya Mountains."... "Moreton Bay fig typically occurs in subtropical (complex notophyll vine forests) but also occurs in warm temperate rainforests (simple notophyll vine forests) and dry rainforests."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Little Jr., E.L. & Skolmen, R.G. 1989. Common forest trees of Hawaii: (native and introduced). USDA Agriculture Handbook No. 679. USDA Forest Service, Washington, D.C.	"... at least 33 other species have also been planted in the forests (about 60 spp. have been introduced). The 3 most common in the forests are Port Jackson fig, <i>Ficus rubiginosa</i> Desf. (40,000 trees planted), Moreton Bay fig, <i>Ficus macrophylla</i> Desf. (36,000 trees), and rough-leaf fig, <i>Ficus nota</i> Merr. (25,000 trees)."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Introduced to the regions and countries listed] "References: New Zealand-E-246, New Zealand-UW-280, New Zealand-W-225, Australia-E-380, New Zealand-UW-425, Pacific-E-621, United States of America-N- 301, Global-NI-714, New Zealand-N-823, United States of America-N-839, New Zealand-U-919, New Zealand-W-964, Australia-N-354, New Zealand-E-328, New Zealand-E-505, Africa-W-1127, United States of America-N-1292, North America- N-1760, New Zealand-ED-2023, New Zealand-U-2048, New Zealand-E-483, United States of America-N-2092, Cook Islands-W-1977, India-W-1977, New Zealand-W-1977, South Africa-W-1977."

301	Naturalized beyond native range	y
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Qsn #	Question	Answer
	Source(s)	Notes
	<p>Starr, F., Starr, K.& Loope, L.L. (2010). New plant records from the Hawaiian Archipelago. Bishop Museum Occasional Papers 107: 61-68</p>	<p>"<i>Ficus macrophylla</i> (Moreton Bay fig) was previously reported from Moloka'i, Maui, and Hawai'i (Oppenheimer & Bartlett 2000; Starr et al. 2002; Oppenheimer 2006). on Midway Atoll, Moreton Bay fig was first collected in 1980 (Herbst & Takeuchi 6331, BISH). It was also collected in 1999 during a botanical survey (Starr & Martz 1999). No signs of reproduction were observed at the time; however, the pollinator wasp, <i>Pleistodontes froggatti</i>, not previously known from Midway Atoll, had been recently collected in 1997 (Nishida 1999). With the wasps present, reproduction could now be possible, and it was suggested that the two large trees be removed to prevent future spread. During a survey in 2008 (Starr et al. 2008), it was found that the two parent trees had not been removed and offspring had begun to spread. The first sapling was observed in the town area by the water plant, far from the two known adult trees. The water plant manager (C. Phosri) revealed that the plant was found nine years prior by his nephew (T. Sonchar) on top of the water tanks, which were ca 100 m from the parent trees, likely transported via mynah birds. The small plant was removed from the structure and planted at the water plant. Saplings were also observed near the two parent trees. This collection represents a new island record for Midway Atoll. Material examined. MIDWAY ATOLL: Sand Island, West Beach, 3–4 sterile saplings of small size (<2 m tall) on old ironwood stump near revetment close to 2 large parent trees on either side of the old cart trail, parent trees with wasps in fruit, mostly green fruit, some ripe, growing with <i>Terminalia catappa</i>, <i>Coccoloba uvifera</i>, and <i>Hibiscus tiliaceus</i>, 3 m (10 ft), 8 Jun 2008, Starr & Starr 080608-09."</p>
	<p>Oppenheimer, H.L. & Bartlett, R.T. (2000). New plant records from Maui, O'ahu, and the Hawai'i Islands. Bishop Museum Occasional Papers 64: 1-10</p>	<p>"<i>Ficus macrophylla</i> Desf. ex Pers. New naturalized record According to Maui Pineapple Co. records, the Moreton Bay fig was introduced to company lands in the 1920s, along with over a dozen other species of <i>Ficus</i>, as part of the Maunalei Arboretum project. Wagner et al. (1999: 924) stated that the pollinator, <i>Pleistodontes froggatti</i> Mayr, was introduced in 1921. Nishida (1994: 142) does not include any record of this fig wasp from Maui, but this is likely due to collecting bias, as <i>Ficus macrophylla</i> is clearly naturalized in areas surrounding the arboretum. This Australian species is a large tree with leaves about 25 cm and purplish, globose fruits 2–3 cm in diameter (Neal, 1965: 313). Although <i>F. macrophylla</i> can be terrestrial, in most of the observations it seems to be epiphytic, at least when young. Eventually roots reach the ground, and the host tree will be smothered or broken by the sheer weight. <i>Ficus macrophylla</i> seems to favor <i>Acacia koa</i>, but small trees have also been noted on <i>Metrosideros polymorpha</i> var. <i>glaberrima</i>, <i>Diospyros sandwicensis</i>, and <i>Schinus terebinthifolius</i>. In an informal germination test, fruits were collected and placed on an old, rotting <i>A. koa</i> log, and seedlings were observed within 3 months. Control methods are being considered before this taxon becomes more widespread, but its epiphytic habit and preference for native trees as hosts makes herbicide options limited. Material examined: MAUI: West Maui, Lahaina District, on steep slope, 4 m high in <i>Acacia koa</i>, west side of Honolua Valley, 396 m, 19 May 1999, Oppenheimer H59912; Honokahua Valley, atop a boulder near the streambed, 232 m, 21 May 1999, Oppenheimer H59919."</p>

Qsn #	Question	Answer
	Oppenheimer, H.L. 2006. New Hawai'i Plant Records for 2004. Bishop Museum Occasional Papers 88: 10-15	" <i>Ficus macrophylla</i> Desf.ex Pers. New island record First documented as naturalized on Maui (Oppenheimer & Bartlett 2000: 6) and subsequently found on the Big Island (Starr et al. 2002: 21) the Moreton Bay fig was noted to be growing epiphytically and terrestrially among forestry plantings on Moloka'i. Material examined. MOLOKA'I: Kaunakakai, epiphytic on <i>Eucalyptus robusta</i> and germinating on mossy logs, 880m, 31 Mar 2004, Oppenheimer H30415."
	Starr, F., Martz, K., & Loope, L.L. 2002. New plant records from the Hawaiian archipelago. Bishop Museum Occasional Papers. 69:16-27	"Previously known from Maui (Oppenheimer & Bartlett, 2000: 6-7), <i>F. macrophylla</i> (Moreton Bay fig) is naturalized in at least the Kailua-Kona area of Hawai'i. This collection represent a new island record for Hawai'i. Material examined. HAWA'I: Kailua-Kona, Ali'i Dr., coming up in bare lava and lowland coastal forest, more abundant towards mature trees in downtown, near sea level, 9 Apr 2000, Starr & Martz 000409-4."
	Gardner, R. O., & Early, J. W. (1996). The naturalisation of banyan figs (<i>Ficus</i> spp., Moraceae) and their pollinating wasps (Hymenoptera: Agaonidae) in New Zealand. New Zealand Journal of Botany, 34(1), 103-110	"The Australian banyan-type fig trees <i>Ficus macrophylla</i> and <i>F. rubiginosa</i> are commonly cultivated in northern New Zealand. Both have now acquired their pollinating wasps, apparently by longdistance dispersal. <i>Pleistodontes imperialis</i> , the wasp specific to <i>F. rubiginosa</i> , arrived within the last 20 years or so, and naturalised plants are found near parent trees. The wasp specific to <i>F. macrophylla</i> , <i>P. froggatti</i> , is newly recorded here for New Zealand, and naturalisation of this fig too seems inevitable. The size and vigour of both figs and their lack of natural enemies (notably an immunity to possum browsing) indicate that they may be able to invade forest and other native plant communities."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Cited as naturalized or weedy in a number of locations] "References: New Zealand-E-246, New Zealand-UW-280, New Zealand-W-225, Australia-E-380, New Zealand-UW-425, Pacific-E-621, United States of America-N- 301, Global-NI-714, New Zealand-N-823, United States of America-N-839, New Zealand-U-919, New Zealand-W-964, Australia-N-354, New Zealand-E-328, New Zealand-E-505, Africa-W-1127, United States of America-N-1292, North America- N-1760, New Zealand-ED-2023, New Zealand-U-2048, New Zealand-E-483, United States of America-N-2092, Cook Islands-W-1977, India-W-1977, New Zealand-W-1977, South Africa-W-1977."

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Oppenheimer, H.L. & Bartlett, R.T. (2000). New plant records from Maui, O'ahu, and the Hawai'i Islands. Bishop Museum Occasional Papers 64: 1-10	[No evidence to date. Impacts native trees, but could potentially affect trees in landscaping] "Although <i>F. macrophylla</i> can be terrestrial, in most of the observations it seems to be epiphytic, at least when young. Eventually roots reach the ground, and the host tree will be smothered or broken by the sheer weight. <i>Ficus macrophylla</i> seems to favor <i>Acacia koa</i> , but small trees have also been noted on <i>Metrosideros polymorpha</i> var. <i>glaberrima</i> , <i>Diospyros sandwicensis</i> , and <i>Schinus terebinthifolius</i> ."

303	Agricultural/forestry/horticultural weed	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence to date

304	Environmental weed	y
	Source(s)	Notes
	Benitez, D.M., R. Loh, T. Tunison, N.G. Zimmer, J. Makaïke, R. Mattos and M. Casali. (2012). The distribution of invasive plant species of concern in the Kīlauea and Mauna Loa strip areas of Hawai'i Volcanoes National Park, 2000-2010. Tech. Report No. 179. HCSU & PCSU, University of Hawaii, Honolulu, HI	"Moreton bay fig (<i>Ficus macrophylla</i>) is a large tree native to Australia recently naturalized in Hawai'i (Wagner et al. 1999, Oppenheimer and Bartlett 2000). In HAVO, a Moreton Bay fig was found apparently planted at the 'Āinahou Ranch. This 10 m tall tree was treated in 2007 using a basal bark application of 15% Garlon 4 in diesel fuel oil, as a precautionary measure to prevent the new establishment of this potentially invasive tree. Like other <i>Ficus</i> spp, Moreton bay fig depends on a single symbiotic wasp species for pollination. The wasp pollinator for Moreton bay fig was deliberately introduced to Hawai'i in 1921 and both the plant and the wasp appear naturalized (Wagner et al. 1999)." [According to "Table 1. Common and scientific names of species mapped in HAVO from 2000 to 2010, including distribution and current control strategy. Scientific name Common name Habit Distribution" <i>Ficus macrophylla</i> is targeted for eradication because of its potential for negative environmental impacts]
	Friday, J. B. (2017). <i>Ficus macrophylla</i> tree. November 9. https://www.flickr.com/photos/jbfriday/43325441102 . [Accessed 14 Oct 2019]	"Moreton Bay fig is a large, spectacular tree that was planted as a reforestation species in Hawaii's forests. However, the tree has also been invading native forests and parasitizing the native 'ōhi'a (<i>Metrosideros polymorpha</i>). Moreton Bay fig is one species of strangler fig, so called because the germinate high up in a tree then grow down and "strangle" a tree, cutting it off from sunlight. Kalopa State Recreation Area, Paauilo, Hawaii Island, Hawaii."
	Starr, F., Starr, K. & Loope, L. (2003). <i>Ficus macrophylla</i> . http://www.starrenvironmental.com/publications/species_reports/pdf/ficus_macrophylla.pdf . [Accessed]	"When <i>F. macrophylla</i> plantings are located near native forests, native tree species, such as koa (<i>Acacia koa</i>) and ohia (<i>Metrosideros polymorpha</i>), are often hosts of <i>F. macrophylla</i> . The host trees will eventually be strangled and replaced by the <i>F. macrophylla</i> ."
	Oppenheimer, H.L. & Bartlett, R.T. (2000). New plant records from Maui, O'ahu, and the Hawai'i Islands. Bishop Museum Occasional Papers 64: 1-10	[Impacts native plants] "Although <i>F. macrophylla</i> can be terrestrial, in most of the observations it seems to be epiphytic, at least when young. Eventually roots reach the ground, and the host tree will be smothered or broken by the sheer weight. <i>Ficus macrophylla</i> seems to favor <i>Acacia koa</i> , but small trees have also been noted on <i>Metrosideros polymorpha</i> var. <i>glaberrima</i> , <i>Diospyros sandwicensis</i> , and <i>Schinus terebinthifolius</i> ."

Qsn #	Question	Answer
	WRA Specialist. (2019). Personal Communication	Native <i>Metrosideros polymorpha</i> ('ohi'a) trees are being colonized and strangled by <i>Ficus macrophylla</i> in the Kalōpā State Recreation Area, Hawaii Island. In particular, large, old growth 'ohi'a trees along the Kalopa Nature Trail are being affected by both the <i>Ficus macrophylla</i> invasion, as well as by the fungal disease known as Rapid 'Ōhi'a Death. A local volunteer group, affiliated with the Pa'auiolo Mauka Kalopa Community Association, and with assistance from the Big Island Invasive Species Committee, has been treating <i>F. macrophylla</i> trees with 100% Garlon 4 applied to the strangling roots since fall 2018. The goal is to control this invasive tree and to prevent further damage to the native 'ohi'a trees and the associated native forests. Initial results of herbicide applications appear promising, with >75% defoliation to most trees after 2-3 months. Larger trees may require repeated application to achieve 100% mortality.

305	Congeneric weed	y
	Source(s)	Notes
	Loope, L.L., Nagata, R.J. & Medeiros, A.C. 1992. Alien plants in Haleakala National Park Pp. 551-576 in Stone et al (eds) Alien plant invasions in native ecosystems of Hawaii. Coop. Nat. Park Resources Studies Unit, University of Hawaii, Honolulu, HI	"Chinese banyan, <i>Ficus microcarpa</i> . Chinese banyan is a strangling, aggressive invader on rocky walls of low-elevation stream courses and sea cliffs in lower Kipahulu. The several dozen known established plants present in the Park should be removed as soon as possible in order to prevent this species from taking over these habitats."
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Environmental impact: Besides shading with its broad canopy, it is a threat to host plants. Banyan roots are very destructive to infrastructures: pavement, home foundations, irrigation ditches."
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	" <i>Ficus carica</i> ... The fast-growing tree has often escaped cultivation and has become invasive in several regions. The tree forms dense thickets crowding out native trees and understory shrubs in river accompanying forests (Bossard et al., 2000). The dense foliage casts heavy shade, reducing growth of native plants under the crown." ... " <i>Ficus microcarpa</i> ... Little is known about direct ecological effects of colonized host trees or invaded communities. The tree forms impenetrable thickets due to the numerous hanging aerial roots that likely shade out other plants. If laurel fig seedlings grow as epiphytes on trees they send aerial roots to the ground. This may affect the host tree by competing for light and nutrients and because of the constricting roots."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes

Qsn #	Question	Answer
	Chew, W.-L. (1989) Moraceae, Flora of Australia 3: 15-68	[No evidence] "Tree to 55 m with wide-spreading crown; trunk to 2 m diam., strongly buttressed. Leaves broadly elliptic to oblong, often broadly ovate, acute to bluntly acuminate, the base broadly cuneate to subrotund; lamina 10–25 cm long, 7–12 cm wide, ferruginous-pubescent beneath, often becoming glabrous; primary lateral veins 13–16 pairs, slightly more prominent than the secondary ones; petiole 5–10 cm long; stipules to 15 cm long, lightly pubescent. Figs paired, globose to oblong, 2–2.5 cm diam.; ostiole minute, hardly raised; basal bracts 2, very broadly ovate; peduncle 2–2.5 cm long, 0.6 cm diam. Male flowers pedicellate; tepals 3 or 4. Female flowers shortly pedicellate; tepals usually 3; tyle short; stigma simple."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	Notes
	Boland, D.J. , Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A., McDonald, M.W. & Turner, J.D. 2006. Forest Trees of Australia. CSIRO Publishing, Collingwood, Australia	[Strangling epiphyte] "In rainforests this species may begin life from seed lodged by birds in the bark or branch forks of another tree. The aerial roots develop in an anastomosing lattice and gradually enmesh and strangle the host."

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Chew, W.-L. (1989) Moraceae, Flora of Australia 3: 15-68	"Fallen leaves have been reported palatable to stock."
	Maiden, J. H. (1897). Some Native Australian Fodder plants (Other Than Grasses and Salt-bushes). The Agricultural Gazette of New South Wales Vol. VIII, Part 10: 685-697	"Ficus macrophylla, Desf. " Moreton Bay Fig." This is an excellent fodder plant, cattle and horses eating the leaves, young twigs, and figs with great zest."
	Gardner, R. O., & Early, J. W. (1996). The naturalisation of banyan figs (<i>Ficus</i> spp., Moraceae) and their pollinating wasps (Hymenoptera: Agaonidae) in New Zealand. New Zealand Journal of Botany, 34(1), 103-110	[Not browsed by brush-tailed possums in New Zealand] "Just the size and vigour of these trees would make them strong competitors should they establish in our forests, but they also have an added advantage, notably over pohutukawa (<i>Metrosideros excelsa</i> Sol. ex Gaertn.) and northern rata (<i>M. robusta</i> A.Cunn.), in that their foliage is not browsed by possums (ROG pers. obs.; M . Ayrton, P. J. de Lange pers. comms.)."

405	Toxic to animals	n
	Source(s)	Notes
	Chew, W.-L. (1989) Moraceae, Flora of Australia 3: 15-68	"Fallen leaves have been reported palatable to stock." [No evidence]
	Maiden, J. H. (1897). Some Native Australian Fodder plants (Other Than Grasses and Salt-bushes). The Agricultural Gazette of New South Wales Vol. VIII, Part 10: 685-697	[No evidence] "Ficus macrophylla, Desf. " Moreton Bay Fig." This is an excellent fodder plant, cattle and horses eating the leaves, young twigs, and figs with great zest."

Qsn #	Question	Answer
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	Y
	Source(s)	Notes
	Penrose, L. J., & Nikandrow, A. (1971). <i>Ficus macrophylla</i> , a new host for <i>Aphelenchoides fragariae</i> (Ritzema Bos) Christie. <i>Search</i> , 2(5): 170	"AB: <i>Ficus macrophylla</i> var. Moreton Bay Fig, in a commercial glasshouse in Australia, was infected with <i>Aphelenchoides fragariae</i> . This is the first record of <i>A. fragariae</i> on this host and, in Australia, on any <i>Ficus</i> sp." [A generalist foliar nematode known to infect 250 host species]
	CABI. (2019). <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	" <i>Ficus macrophylla</i> (moreton Bay fig) " ... "Minor host of: <i>Aphelenchoides fragariae</i> (strawberry crimp nematode); <i>Dialeurodes citri</i> (citrus whitefly)"
	Brickell, C. & Zuk, J.D. (1997). <i>The American Horticultural Society A-Z Encyclopedia of Garden Plants</i> . DK Publishing, Inc., New York, NY	Brickell and Zuk (1997) report the following pests and diseases of <i>Ficus</i> spp.: mealybugs, scale insects, spider mites, root knot nematodes, and thrips occur under most environmental conditions, fungal and bacterial leaf spots, crown gall, twig dieback, and Southern blight.

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes
	Tropical Plants Database, Ken Fern. (2019). <i>Ficus macrophylla</i> . http://tropical.theferns.info/viewtropical.php?id=Ficus+macrophylla . [Accessed 15 Oct 2019]	"Fruit - raw[144]. Acceptable when fully ripe[144]. The fruit is 18 - 25mm in diameter[265]. Sweet and tasty, though most of the fruit consists of gritty seeds[193]. The globose fig is purplish when ripe [423]."
	SelecTree. "Ficus macrophylla Tree Record." 1995-2019. Oct 14, 2019. https://selectree.calpoly.edu/tree-detail/ficus-macrophylla . [Accessed 15 Oct 2019]	"Irritant Health Hazard."
	Rietschel, R. L. & Fowler, J. F. (2008). <i>Fisher's Contact Dermatitis</i> 6. BC Decker Inc, Hamilton, Canada	[Potential skin irritant] "Patch testing with hairy plants can produce irritant patch test reactions. Some irritant, hairy plants are listed in Table 21.17. Indoor linden (<i>Sparmannia</i>) can produce irritant patch test reactions and is also probably allergenic. Thus, judicious patch testing with the plant and its extracts is required. The T-shaped hairs of blood-twigg dogwood (<i>Cornus sanguinea</i>) produce urticarial reactions if the leaf is rubbed on the skin in the direction of its long axis. Some other commonly grown hairy plants produce irritant patch test reactions from their leaves (for example, cineraria (<i>Senecio</i>), primrose (<i>Primula sinensis</i>), and fig (<i>Ficus macrophylla</i>)."

Qsn #	Question	Answer
408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	<p>SelecTree. "Ficus macrophylla Tree Record." 1995-2019. Oct 14, 2019. https://selectree.calpoly.edu/tree-detail/ficus-macrophylla. [Accessed 15 Oct 2019]</p>	"Fire Resistance is Favorable."
	<p>Chew, W.-L. (1989) Moraceae, Flora of Australia 3: 15-68</p>	[Rainforest habitat may be less prone to fires] "Occurs from north-eastern Qld S to Nowra, N.S.W.; grows in montane or coastal rainforest"

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	<p>Thomas, M. B. & Teoh, S. L. (1983) Culture of container-grown <i>Ficus macrophylla</i>. II. Influence of shading and N fertilization. Royal New Zealand Institute of Horticulture Annual Journal 11: 77-82</p>	"AB: Plants in a peat:sand (1:1, v/v) medium received 3 N levels (225, 300 or 375 g/m ³) and 3 shade levels (20, 60 or 80%). Plant height, internode length, stem diameter, leaf area and foliar dry weight were all greatest with 20% shading and 300-375 g N/m ³ . Leaf colour and visual ratings of foliage were enhanced by 60-80% shade but chlorophyll content remained greatest with 20% shade." [Survives 80% shade]
	<p>SelecTree. "Ficus macrophylla Tree Record." 1995-2019. Oct 14, 2019. https://selectree.calpoly.edu/tree-detail/ficus-macrophylla. [Accessed 15 Oct 2019]</p>	"Exposure Full Sun to Partial Shade."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	<p>Australian Native Plant Society. (2019). <i>Ficus macrophylla</i>. http://anpsa.org.au/f-mac.html. [Accessed 15 Oct 2019]</p>	"It is adaptable to a range of soils and appreciates adequate moisture."
	<p>SelecTree. "Ficus macrophylla Tree Record." 1995-2019. Oct 14, 2019. https://selectree.calpoly.edu/tree-detail/ficus-macrophylla. [Accessed 15 Oct 2019]</p>	"Moist Soil. Clay, Loam or Sand Texture. Slightly Acidic to Highly Alkaline Soil pH."
	<p>Boland, D.J. , Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A., McDonald, M.W. & Turner, J.D. 2006. Forest Trees of Australia. CSIRO Publishing, Collingwood, Australia</p>	"This species grows in a wide range of sites from river valleys to hills of moderate slope. Soils are usually derived from alluvium at lower elevations while at higher elevations they are red clay loams derived from basalts."

411	Climbing or smothering growth habit	y
	Source(s)	Notes
	<p>Little Jr., E.L. & Skolmen, R.G. 1989. Common forest trees of Hawaii: (native and introduced). USDA Agriculture Handbook No. 679. USDA Forest Service, Washington, D.C.</p>	"In rainforests this species may begin life from seed lodged by birds in the bark or branch forks of another tree. The aerial roots develop in an anastomosing lattice and gradually enmesh and strangle the host."

412	Forms dense thickets	
	Source(s)	Notes

Qsn #	Question	Answer
	Australian Native Plant Society. (2019). <i>Ficus macrophylla</i> . http://anpsa.org.au/f-mac.html . [Accessed 15 Oct 2019]	[Form columnaris could form a "dense stand" with its trunks that could effectively exclude other vegetation] "Two forms are recognised: <i>F. macrophylla</i> f. <i>macrophylla</i> (which is found on the mainland) and <i>F. macrophylla</i> f. <i>columnaris</i> (from Lord Howe Island). The latter is so named due to the column-like trunks which develop from the roots - it is reported that specimens of this form can cover extensive areas of 1 hectare or more."

501	Aquatic	n
	Source(s)	Notes
	Chew, W.-L. (1989) <i>Moraceae</i> , <i>Flora of Australia</i> 3: 15-68	[Terrestrial] "Tree to 55 m with wide-spreading crown... grows in montane or coastal rainforest, often in soils derived from volcanics or alluvium."

502	Grass	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 14 Oct 2019]	Section: Malvanthera Family: Moraceae Tribe: Ficeae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 14 Oct 2019]	Section: Malvanthera Family: Moraceae Tribe: Ficeae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Chew, W.-L. (1989) <i>Moraceae</i> , <i>Flora of Australia</i> 3: 15-68	"Tree to 55 m with wide-spreading crown; trunk to 2 m diam., strongly buttressed."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Australian Native Plant Society. (2019). <i>Ficus macrophylla</i> . http://anpsa.org.au/f-mac.html . [Accessed 15 Oct 2019]	"Conservation Status: Not considered to be at risk in the wild."

Qsn #	Question	Answer
	Boland, D.J. , Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A., McDonald, M.W. & Turner, J.D. 2006. Forest Trees of Australia. CSIRO Publishing, Collingwood, Australia	[No evidence] "This species occurs from the isolated Mt Dromedary population near Narooma, New South Wales, in the south, to near Brisbane in the north. The main southern stands of the species occur in the Illawarra district, New South Wales, such as around Kangaroo Valley, Minnamurra Falls and Kiama. In the northern part of the State it is found in most forests from Wingham to the Tweed River. In Queensland it is common in the southern forests and around Moreton Bay, and as far west as the Bunya Mountains."

602	Produces viable seed	y
	Source(s)	Notes
	Oppenheimer, H.L. & Bartlett, R.T. (2000). New plant records from Maui, O'ahu, and the Hawai'i Islands. Bishop Museum Occasional Papers 64: 1-10	"In an informal germination test, fruits were collected and placed on an old, rotting A. koa log, and seedlings were observed within 3 months."
	Gardner, R. O., & Early, J. W. (1996). The naturalisation of banyan figs (<i>Ficus</i> spp., Moraceae) and their pollinating wasps (Hymenoptera: Agaonidae) in New Zealand. New Zealand Journal of Botany, 34(1), 103-110	"it is noted that the Moreton Bay fig trees at Westfield and Pahi have well-formed viable seed (see above), although viability of seed from the second crop to develop at Pahi should be tested to demonstrate conclusively whether <i>F. macrophylla</i> can be successfully self-pollinated."
	Australian Native Plant Society. (2019). <i>Ficus macrophylla</i> . http://anpsa.org.au/f-mac.html . [Accessed 15 Oct 2019]	"Propagation is usually from seed which germinates well without any pretreatment. Cuttings may also strike successfully."

603	Hybridizes naturally	n
	Source(s)	Notes
	Simoes, M. (2018). Genetic diversity and structure of Moreton Bay fig (<i>Ficus macrophylla</i>) in mainland Australia and Lord Howe Island, Masters Thesis. Western Sydney University, Sydney, AU	[Two forms of <i>F. macrophylla</i> may hybridize] "From the data presented in Figures 6 and 7 for flowering phenology and seed viability it is evident that the two <i>Ficus macrophylla</i> forms require maintained segregation to prevent hybridisation and self-pollination to ensure sustainable genetic diversity of both populations."

604	Self-compatible or apomictic	
	Source(s)	Notes
	Gardner, R. O., & Early, J. W. (1996). The naturalisation of banyan figs (<i>Ficus</i> spp., Moraceae) and their pollinating wasps (Hymenoptera: Agaonidae) in New Zealand. New Zealand Journal of Botany, 34(1), 103-110	"Since self-pollination occurs in <i>F. rubiginosa</i> (ROG pers. obs.), we see no reason why it should not also occur in <i>F. macrophylla</i> . Isolated trees in remote areas may, therefore, be capable of establishing populations once their wasp catches up with them."

Qsn #	Question	Answer
	<p>Simoes, M. (2018). Genetic diversity and structure of Moreton Bay fig (<i>Ficus macrophylla</i>) in mainland Australia and Lord Howe Island, Masters Thesis. Western Sydney University, Sydney, AU</p>	<p>"The overall levels of observed heterozygosity were less than that expected based on Hardy Weinberg Equilibrium, such that the inbreeding coefficient for <i>F. macrophylla</i> was moderate ($F = 0.26 \pm 0.05$; Table 2). All three populations have reduced levels of heterozygosity (comparison between H_o and uHe; Table 2), resulting in the inbreeding coefficient (F) being greater than 0. This indicates the system is not randomly mating, and there is evidence for partial self and/or biparental inbreeding ($F = 0.24$ to 0.32) in all populations." ... "the inbreeding coefficient indicated there is non-random mating occurring and therefore is evidence for partial self and/or biparental breeding ($F = 0.24 - 0.32$) in all populations." ... "From the data collected during the phenological surveys it is illustrated that both forms during October to December share a similar flowering phenology with a large overlap in the release of fig wasp pollinators and the availability of receptive figs for pollination, which suggest that the possibility of hybridisation but also self-pollination was possible (Figure 6)."</p>

605	Requires specialist pollinators	y
	Source(s)	Notes
	<p>Abrol, D.P. (2012). Pollination Biology: Biodiversity Conservation and Agricultural Production. Springer, New York</p>	<p>"Several authors (Ramirez 1974) have indicated that the specificity of the agaonid- fig association ensures that a given fig will produce seed only when its specific agaonid is present. Species of Agaonidae live exclusively in fig inflorescences where they act as pollinating agents. In <i>Ficus macrophylla</i> the winged females of <i>Pleistodontes froggatti</i> (Agaonidae) are the pollen vectors, whereas the wingless, highly modified males play no part in the pollination process."</p>
	<p>Swezey, O. H. (1926). Recent introductions of beneficial insects in Hawaii. <i>Journal of Economic Entomology</i>, 19(5), 714-720</p>	<p>[The first record of introduction of pollinator wasp for <i>F. macrophylla</i> (<i>Pleistodontes froggatti</i>) is 1921] "The records of. these introductions are very scattered, and in some cases very obscure, possibly entirely lacking in many cases. Herewith an attempt is made to put together for convenient reference the records of all successful introductions, so far as they could be found. They are grouped according to the various purposes for which they were introduced. The date of introduction is given, so far as known, the country from which introduced, and the particular pest on which it preys." ... "1921. <i>Pleistodontes froggatti</i> Mayr. Australia. Caprifier of <i>Ficus macrophylla</i>."</p>

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	<p>Australian Native Plant Society. (2019). <i>Ficus macrophylla</i>. http://anpsa.org.au/f-mac.html. [Accessed 15 Oct 2019]</p>	<p>"Propagation is usually from seed which germinates well without any pretreatment. Cuttings may also strike successfully." [No evidence of natural vegetative spread]</p>
	<p>Benson, D. & McDougall, L. (1997). Ecology of Sydney Plant Species. Part 5. Dicotyledon families Flacourtiaceae to Myrsinaceae. <i>Cunninghamia</i> 5(2): 330-544</p>	<p>"Vegetative spread: No"</p>

607	Minimum generative time (years)	

Qsn #	Question	Answer
	Source(s)	Notes
	<p>SelectTree. "Ficus macrophylla Tree Record." 1995-2019. Oct 14, 2019. https://selecttree.calpoly.edu/tree-detail/ficus-macrophylla. [Accessed 15 Oct 2019]</p> <p>Benson, D. & McDougall, L. (1997). Ecology of Sydney Plant Species. Part 5. Dicotyledon families Flacourtiaceae to Myrsinaceae. <i>Cunninghamia</i> 5(2): 330-544</p>	<p>"Growth Rate: 36 Inches per Year."</p> <p>"Primary juvenile period:" [No data provided. Possibly greater than 4 years, but confirmation needed]</p>

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	<p>Benson, D. & McDougall, L. (1997). Ecology of Sydney Plant Species. Part 5. Dicotyledon families Flacourtiaceae to Myrsinaceae. <i>Cunninghamia</i> 5(2): 330-544</p>	<p>"Dispersal, establishment & growth: Diaspore: fig, main fruit drop beneath canopy, distance dispersal by Flying Foxes, birds."</p>

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	<p>Little Jr., E.L. & Skolmen, R.G. 1989. Common forest trees of Hawaii: (native and introduced). USDA Agriculture Handbook No. 679. USDA Forest Service, Washington, D.C.</p>	<p>"... at least 33 other species have also been planted in the forests (about 60 spp. have been introduced). The 3 most common in the forests are Port Jackson fig, <i>Ficus rubiginosa</i> Desf. (40,000 trees planted), Moreton Bay fig, <i>Ficus macrophylla</i> Desf. (36,000 trees), and rough-leaf fig, <i>Ficus nota</i> Merr. (25,000 trees)."</p>
	<p>Wong, M. (2007). <i>Ficus</i> Plants for Hawai'i Landscapes. Ornamentals and Flowers OF-34. College of Tropical Agriculture and Human Resources, Honolulu, HI</p>	<p>"<i>Ficus macrophylla</i> (Moreton Bay fig, Fig 6) is also large and somewhat tolerant of beach conditions. A large specimen can be seen at Kailua Beach Park on O'ahu." [<i>Ficus macrophylla</i> (Moreton Bay fig) listed among Some ficuses to consider for cultivation in the Hawaiian Islands]</p>
	<p>Staples, G.W. & Herbst, D.R. 2005. <i>A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places</i>. Bishop Museum Press, Honolulu, HI</p>	<p>"Moreton Bay fig is native to Australia and is sometimes cultivated in several tropical countries. It may have been introduced to Hawai'i as early as 1851, when a shipment of plants, seeds, and bulbs reached Honolulu from the Sydney (Australia) Botanic Gardens. Today, the domed crowns of these impressive banyans can be seen in several parks around Honolulu, such as the fine row along the Paid Avenue side of Kapi'olani Park and those surrounding Mo'ilili Park. There is an exceptional specimen on the grounds of the Baldwin estate in Ha'iku, Maui. As with the other banyans, Moreton Bay fig is far too large a tree for the home garden. It was widely used for reforestation, with some 36,000 trees planted in Hawaiian forest reserves."</p>

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	<p>Benson, D. & McDougall, L. (1997). Ecology of Sydney Plant Species. Part 5. Dicotyledon families Flacourtiaceae to Myrsinaceae. <i>Cunninghamia</i> 5(2): 330-544</p>	<p>"Dispersal, establishment & growth: Diaspore: fig, main fruit drop beneath canopy, distance dispersal by Flying Foxes, birds."</p>

704	Propagules adapted to wind dispersal	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Benson, D. & McDougall, L. (1997). Ecology of Sydney Plant Species. Part 5. Dicotyledon families Flacourtiaceae to Myrsinaceae. <i>Cunninghamia</i> 5(2): 330-544	"Dispersal, establishment & growth: Diaspore: fig, main fruit drop beneath canopy, distance dispersal by Flying Foxes, birds. Germinates as epiphyte or lithophyte sometimes 10 m above ground (evidently light-sensitive) and sends roots to ground; these subsequently strangle the host."

705	Propagules water dispersed	n
	Source(s)	Notes
	Benson, D. & McDougall, L. (1997). Ecology of Sydney Plant Species. Part 5. Dicotyledon families Flacourtiaceae to Myrsinaceae. <i>Cunninghamia</i> 5(2): 330-544	[Water might disperse fallen fruit, but germinates on host trees or possibly rocks high above the ground] "Dispersal, establishment & growth: Diaspore: fig, main fruit drop beneath canopy, distance dispersal by Flying Foxes, birds. Germinates as epiphyte or lithophyte sometimes 10 m above ground (evidently light-sensitive) and sends roots to ground; these subsequently strangle the host."

706	Propagules bird dispersed	y
	Source(s)	Notes
	Benson, D. & McDougall, L. (1997). Ecology of Sydney Plant Species. Part 5. Dicotyledon families Flacourtiaceae to Myrsinaceae. <i>Cunninghamia</i> 5(2): 330-544	"Dispersal, establishment & growth: Diaspore: fig, main fruit drop beneath canopy, distance dispersal by Flying Foxes, birds. Germinates as epiphyte or lithophyte sometimes 10 m above ground (evidently light-sensitive) and sends roots to ground; these subsequently strangle the host."
	Wotton, D. M., & McAlpine, K. G. (2015). Seed dispersal of fleshy-fruited environmental weeds in New Zealand. <i>New Zealand Journal of Ecology</i> , 39(2), 155-169	"Several multi-seeded weeds (e.g. <i>Ficus macrophylla</i> , <i>Opuntia monacantha</i> , <i>Passiflora caerulea</i> , <i>P. edulis</i> , <i>P. tarminiana</i> , and <i>Psidium guajava</i>) also have fruits too large for dispersers other than kererū to swallow whole. However, smaller bird and mammal species can eat multi-seeded fruits in pieces and disperse seeds."
	Starr, F., Starr, K. & Loope, L. (2003). <i>Ficus macrophylla</i> . http://www.starrenvironmental.com/publications/species_reports/pdf/ficus_macrophylla.pdf . [Accessed 15 Oct 2019]	"Various birds observed by the authors foraging and roosting in other <i>Ficus</i> trees on Maui include mynah birds (<i>Acridotheres tristis</i>), blue faced doves (<i>Geopelia striata</i>), lace necked doves (<i>Streptopelia chinensis</i>), Japanese white-eye (<i>Zosterops japonicus</i>), and house sparrows (<i>Passer domesticus</i>), though there are probably more. Other animals, such as bats, pigs, rodents, parrots, and monkeys may be capable of spreading fruit."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Benson, D. & McDougall, L. (1997). Ecology of Sydney Plant Species. Part 5. Dicotyledon families Flacourtiaceae to Myrsinaceae. <i>Cunninghamia</i> 5(2): 330-544	[Internally dispersed] "Dispersal, establishment & growth: Diaspore: fig, main fruit drop beneath canopy, distance dispersal by Flying Foxes, birds. Germinates as epiphyte or lithophyte sometimes 10 m above ground (evidently light-sensitive) and sends roots to ground; these subsequently strangle the host."

708	Propagules survive passage through the gut	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Benson, D. & McDougall, L. (1997). Ecology of Sydney Plant Species. Part 5. Dicotyledon families Flacourtiaceae to Myrsinaceae. Cunninghamia 5(2): 330-544	"Dispersal, establishment & growth: Diaspore: fig, main fruit drop beneath canopy, distance dispersal by Flying Foxes, birds. Germinates as epiphyte or lithophyte sometimes 10 m above ground (evidently light-sensitive) and sends roots to ground; these subsequently strangle the host."

801	Prolific seed production (>1000/m2)	y
	Source(s)	Notes
	Boland, D.J. , Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A., McDonald, M.W. & Turner, J.D. 2006. Forest Trees of Australia. CSIRO Publishing, Collingwood, Australia	"Fruits: Fleshy receptacle, globular, about 2.5 cm diameter, orange, turning purple, dotted white when ripe, borne on thick stalks 2–2.5 cm long, arising from the axils of the leaves. Fruits are edible, but rather dry." [Ficus synconium contain numerous minute fruits; pollinator is present in the Hawaiian Islands]

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Doyle, G. (2000). Strangler figs in a stand of dry rainforest in the lower Hunter Valley, NSW. Australian Geographer, 31(2), 251-264	"It appears that desiccation of the germination substrate could be the major cause of the high rate of juvenile hemi-epiphytic Ficus mortality. " [Probably no seedbank]

803	Well controlled by herbicides	y
	Source(s)	Notes
	Randall, J.M. & Marinelli, J. (eds.) (1996). Invasive Plants: Weeds of the Global Garden. Brooklyn Botanic Garden, Brooklyn, NY	"Fig trees are particularly sensitive to triclopyr herbicides as a basal or cut-stump treatment. Trees found growing on concrete or rock structures should be treated with herbicide while young to avoid costly structural damage. Use extreme caution when applying herbicide to figs growing as epiphytes to ensure that the poison does not contact the host tree. When exotic figs germinate high in the branches of large trees in natural forest communities, it may be extraordinarily difficult to get close enough to the fig to treat it."
	Benitez, D.M., R. Loh, T. Tunison, N.G. Zimmer, J. Makaike, R. Mattos and M. Casali. (2012). The distribution of invasive plant species of concern in the Kīlauea and Mauna Loa strip areas of Hawai'i Volcanoes National Park, 2000-2010. Tech. Report No. 179. HCSU & PCSU, University of Hawaii, Honolulu, HI	"Moreton bay fig (<i>Ficus macrophylla</i>) is a large tree native to Australia recently naturalized in Hawai'i (Wagner et al. 1999, Oppenheimer and Bartlett 2000). In HAVO, a Moreton Bay fig was found apparently planted at the 'Āinahou Ranch. This 10 m tall tree was treated in 2007 using a basal bark application of 15% Garlon 4 in diesel fuel oil, as a precautionary measure to prevent the new establishment of this potentially invasive tree."

Qsn #	Question	Answer
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	[Methods to control <i>F. microcarpa</i> may be effective] "The most effective way to kill large Chinese banyans is by placing 0.10–0.17 fl oz (3–5 ml) of herbicide into holes drilled into the trunk each foot around trunk. Because of the compartmentalization of the trunks from the rooted and merged adventitious roots, the trunks must be drilled at each segment to ensure effective control. This can best be done by making follow-up treatments after symptoms from earlier treatments reveal unaffected stem segments. Banyans strangling a host tree can be treated in this way with glyphosate without killing the host. Triclopyr and dicamba were also effective in killing banyan by applications to drilled holes."
	WRA Specialist. (2019). Personal Communication	Native <i>Metrosideros polymorpha</i> ('ohi'a) trees are being colonized and strangled by <i>Ficus macrophylla</i> in the Kalōpā State Recreation Area, Hawaii Island. In particular, large, old growth 'ohi'a trees along the Kalopa Nature Trail are being affected by both the <i>Ficus macrophylla</i> invasion, as well as by the fungal disease known as Rapid 'Ōhi'a Death. A local volunteer group, affiliated with the Pa'auiolo Mauka Kalopa Community Association, and with assistance from the Big Island Invasive Species Committee, has been treating <i>F. macrophylla</i> trees with 100% Garlon 4 applied to the strangling roots since fall 2018. The goal is to control this invasive tree and to prevent further damage to the native 'ohi'a trees and the associated native forests. Initial results of herbicide applications appear promising, with >75% defoliation to most trees after 2-3 months. Larger trees may require repeated application to achieve 100% mortality.

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Ishtiaq, M., & Khan, J. (1995). Performance of Different Species of Rubber Plant Stem Cuttings Under Agroclimatic Conditions of Pashawar. <i>Sarhad Journal of Agriculture</i> , 11, 455-458	"AB: In an experiment conducted at Peshawar in 1993, the performance of stem cuttings of <i>Ficus pumila</i> , <i>F. macrophylla</i> , <i>F. retusa</i> and <i>F. elastica</i> was studied in a growing medium comprising a 1:1:1 mixture of sand, clay and FYM. The evaluation was based on plant survival, plant height, number of leaves/cutting, number of roots/cutting and root length. Among the species used, <i>F. pumila</i> and <i>F. macrophylla</i> gave better results than <i>F. retusa</i> , whereas <i>F. elastica</i> completely failed in the trial. Greatest plant survival (53%) was observed for <i>F. pumila</i> followed by <i>F. retusa</i> (45%). Greatest plant height (63 cm) and number of leaves/cutting (58) were also recorded for <i>F. pumila</i> , followed by <i>F. macrophylla</i> (24 cm and 16 cm, respectively). <i>F. macrophylla</i> gave the highest number of roots/cutting (10) and greatest root length (98 cm) followed by <i>F. pumila</i> (9 and 97 cm, respectively)."
	West, C.J. 2002. Eradication of alien plants on Raoul Island, Kermadec Islands, New Zealand. Pp. 365-373 in C.R. Veitch & M.N. Clout (eds.). <i>Turning the tide: the eradication of invasive species</i> . IUCN SSC Invasive Species Specialist Group, Gland	"Some species can resprout vigorously from cut stumps despite application of herbicide. Examples are <i>Psidium guajava</i> , <i>Ficus macrophylla</i> and <i>Prunus persica</i> . Return visits to treated stumps, and repeated cutting and herbicide application, are required to kill these individuals. The change from Tordon® granules to a wet herbicide mix has resulted in less regrowth from some of these species."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
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Qsn #	Question	Answer
	Source(s)	Notes
	Starr, F., Starr, K. & Loope, L. (2003). <i>Ficus macrophylla</i> . http://www.starrenvironmental.com/publications/species_reports/pdf/ficus_macrophylla.pdf . [Accessed 15 Oct 2019]	"Biological control: Nadel et al. (1991) report several pests that could be looked at for biological control potential including various ants which were seen carrying off pollinator wasps from <i>Ficus</i> fruits, Hymenoptera and mites that may be parasites of the pollinator wasps, and staphylinids which were seen entering <i>Ficus</i> fruits and eating the pollinator wasps."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Naturalized on Molokai, Maui, Hawaii and Midway Island (Hawaiian Islands), New Zealand, and elsewhere
- An environmental weed in the Hawaiian Islands, establishing on and eventually strangling native forest trees
- Other *Ficus* species are invasive
- Host of other pests and pathogens
- May be a skin irritant
- Shade tolerant
- Tolerates many soil types
- Starts out as an epiphyte and strangles host trees
- Reproduces by seeds (specific pollinator present in the Hawaiian Islands)
- Probably self-fertile
- Seeds dispersed by birds and intentionally cultivated by people
- Able to coppice after cutting

Low Risk Traits

- Unarmed (no spines, thorns, or burrs)
- Provides fodder for livestock
- Ornamental value
- Not reported to spread vegetatively
- Requires a specialized pollinator wasp (which was introduced into the Hawaiian Islands)
- Herbicides may provide effective control