

Taxon: Conocarpus erectus L.	Family: Combretaceae
Common Name(s): button mangrove buttonwood Sea mulberry	Synonym(s): Conocarpus acutifolius Willd. ex Conocarpus procumbens L.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 30 Jul 2018
WRA Score: 5.0	Designation: EVALUATE	Rating: Evaluate

Keywords: Tropical Tree, Naturalized, Coastal, Pure Stands, Water-Dispersed

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	n
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		
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)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	n
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		
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
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	n

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	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		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation		
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
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		
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
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		
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
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	[Widely distributed. No evidence of domestication] "Range.—Button mangrove is native to Bermuda, both coasts of southern Florida, the Bahamas, the West Indies, both coasts of Mexico, Central America, South America (through Ecuador and Brazil), and the Galapagos Islands. It is also native to coastal areas of Tropical West Africa (Howard 1989, Little and Wadsworth 1964). The species has been planted widely as an ornamental and has naturalized in at least Hawaii"

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2018. 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
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 29 Jul 2018]	"Native Africa WEST-CENTRAL TROPICAL AFRICA: Cameroon, Zaire (w.) WEST TROPICAL AFRICA: Guinea, Guinea-Bissau, Liberia, Nigeria, Senegal, Sierra Leone SOUTH TROPICAL AFRICA: Angola (Cabinda) Northern America SOUTHEASTERN U.S.A.: United States [Florida (keys)] Mexico (coastal) Southern America CARIBBEAN: Anguilla, Antigua and Barbuda, Bahamas, Cuba, Grenada, Guadeloupe, Hispaniola, Jamaica, Martinique, Montserrat, Puerto Rico, St. Kitts and Nevis, St. Lucia, St. Vincent and Grenadines, Trinidad and Tobago CENTRAL AMERICA: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama NORTHERN SOUTH AMERICA: French Guiana, Guyana, Suriname, Venezuela BRAZIL: Brazil WESTERN SOUTH AMERICA: Colombia, Ecuador, Peru"

202	Quality of climate match data	High
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Qsn #	Question	Answer
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed]	

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"Button mangrove is intolerant of shade. It is almost always open-grown or in codominant stands. It will tolerate competition by plants of similar size but will not grow under the canopy of taller trees. The species grows above the high tide line, along beaches and just landward of <i>Laguncularia racemosa</i> (L.) Gaertn. and other mangroves. The soils in these situations are usually sandy or marly but sometimes loamy or clayey. Button mangrove is particularly adaptable as an ornamental because it tolerates compacted soil, air pollution, poor drainage, and drought (Gilman and Watson 1993). It also tolerates salt water overwash from storm surges and heavy salt spray. The species grows, although much less commonly, on the lower floodplains of rivers and in upland forests. Herbarium samples have been collected at elevations of 745 m in Costa Rica (Instituto Nacional de Biodiversidad 2002)."
	Gargiullo, M.B., Magnuson, B.L & Kimball, L.D. 2008. A Field Guide to Plants of Costa Rica. Oxford University Press US, New York, NY	"Habitat: Landward part of mangrove forests, open areas above high-tide line. Altitude: Sea level to 750 m, mostly below 100 m, Pacific coast."
	Gilman, E.F. & Watson, D.G. 1993. <i>Conocarpus erectus</i> - Buttonwood. Fact Sheet ST-179. Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. http://hort.ifas.ufl.edu/ . [Accessed 30 Jul 2018]	"USDA hardiness zones: 10B through 11"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i cultivated and sparingly naturalized in coastal areas on O'ahu, Lana'i, and Maui." [Also naturalized on Hawaii Island & Kauai]

Qsn #	Question	Answer
	<p>USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 30 Jul 2018]</p>	<p>"Native Africa WEST-CENTRAL TROPICAL AFRICA: Cameroon, Zaire (w.) WEST TROPICAL AFRICA: Guinea, Guinea-Bissau, Liberia, Nigeria, Senegal, Sierra Leone SOUTH TROPICAL AFRICA: Angola (Cabinda) Northern America SOUTHEASTERN U.S.A.: United States [Florida (keys)] Mexico (coastal) Southern America CARIBBEAN: Anguilla, Antigua and Barbuda, Bahamas, Cuba, Grenada, Guadeloupe, Hispaniola, Jamaica, Martinique, Montserrat, Puerto Rico, St. Kitts and Nevis, St. Lucia, St. Vincent and Grenadines, Trinidad and Tobago CENTRAL AMERICA: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama NORTHERN SOUTH AMERICA: French Guiana, Guyana, Suriname, Venezuela BRAZIL: Brazil WESTERN SOUTH AMERICA: Colombia, Ecuador, Peru"</p>

205	Does the species have a history of repeated introductions outside its natural range?	n
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"The species has been planted widely as an ornamental and has naturalized in at least Hawaii (Pacific Island Ecosystems at Risk 2002)"
	WRA Specialist. 2018. Personal Communication	No additional evidence except Hawaii, and some other Pacific islands. Native range is enormous, leaving few areas available for introductions

301	Naturalized beyond native range	y
	Source(s)	Notes
	Parker, J.L. & Parsons, B. (2012). New plant records from the Big Island for 2009. Bishop Museum Occasional Papers 113: 55–63	"Button mangrove is very popular as a street and shade tree on the island, but we rarely see it naturalizing in cultivation as male trees are preferred in large plantings because they generate less litter than female trees (Staples & Herbst 2005). This specimen was brought to our attention by J.B. Friday and his son Nathan Friday who collected it on a shoreline in Keaukaha. The plant was a resprout from a large stump and had no flowers or fruit, but it was positively identified by Bishop Museum. This is the first record of this species naturalizing on the island. It was previously known from Kaua'i (Lorence & Flynn 1997: 10), O'ahu, Lāna'i, and Maui (Wagner et al. 1999: 547). Material examined. HAWAII: South Hilo distr. 4 mile beach, Keaukaha. located adjacent to shoreline. No fruit or flowers. Growing next to Casuarina trees. collection is a resprout, 1.5 m tall, from a trunk 8 cm in dia, 5 Jul 2009, N. Friday BIED92."

Qsn #	Question	Answer
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to coastal areas of the Neotropics from Florida and Mexico to Ecuador and Brazil, also in tropical western Africa; in Hawai'i cultivated and sparingly naturalized in coastal areas on O'ahu, Lana'i, and Maui. First collected on Maui in 1935 (Yamayoshis.n., BISH)."
	Lorence, D. & Flynn, T. 1997. New Naturalized Plant Records for Kaua'i. Bishop Museum Occasional Papers 49: 9-13	"The button mangrove or buttonwood was recorded as sparingly naturalized in coastal areas on O'ahu, Lana'i, and Maui by Wagner et al. (1990). The following collection represents a new island record for Kaua'i, where this species is naturalized locally forming a small population. Material examined. KAUA'I: Koloa District, Kukuiula small boat harbor, littoral vegetation on lava flow, near sea level, 18 Apr 1996, Lorence 7767 (PTBG)."
	Dhaarani, V., Sarvalingam, A., & Rajendran, A. (2017). A New Mangrove Associated Species Record (<i>Conocarpus</i> L.-Combretaceae) from Tamil Nadu. Current Botany 8: 166-168	"The genus <i>Conocarpus</i> L., (Combretaceae) a naturalized mangrove genus of India, is reported as an addition to the flora of Tamil Nadu. The species <i>Conocarpus erectus</i> L. was known to occur in Western Africa, tropical and subtropical America. A detailed description along with details on habitat, distribution, and photographs and related genus key is provided here." ... "The species are found rare in its new habitat in Pudukkottai, Tamil Nadu; it is witnessed that it will take some years to get naturalized in its new habitat, and it is important to create awareness about the plant in the study area as it has many ecological and economic values."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	AlHusseini, T. I.. (2015). Invasive Alien Species Management in the Kingdom of Bahrain. Supreme Council for Environment, Kingdom of Bahrain	[Possible landscape nuisance] " <i>Conocarpus erectus</i> ... Plant roots have caused severe damage to water pipes and sewage pipes in residential areas, and caused cracks in foundations and floors of some buildings"

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

304	Environmental weed	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i cultivated and sparingly naturalized in coastal areas"
	Allen, J. (1998). Mangroves as alien species: the case of Hawaii. Global Ecology & Biogeography Letters, 7(1), 61-71	"In marked contrast to <i>R. mangle</i> , <i>B. gymnorrhiza</i> and <i>C. erectus</i> have shown little tendency to spread beyond their original planting sites (Fosberg, 1948; Wester, 1981; personal observations). <i>B. gymnorrhiza</i> is currently known to exist only on four sites on Oahu and <i>C. erectus</i> is reported as 'sparingly naturalized' on the islands of Oahu, Lanai, and Maui (Wagner, Herbst & Sohmer, 1990; p.547)."

Qsn #	Question	Answer
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"The species is not aggressive or invasive and only requires control when land is converted to other uses."

305	Congeneric weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence] "Shrubs or trees 3-8 m tall. Leaves chartaceous or somewhat coriaceous and somewhat fleshy, oblanceolate to narrowly elliptic, 2.5-9 cm long, 1-3 cm wide, ± densely silky pubescent, especially on midrib or younger leaves. Peduncles 2-10(-15) mm long, bracts minute, tomentose; hypanthium tomentose; calyx lobes greenish white, triangular, ca. 1 mm long; stamens usually 10."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Shrubs or trees 3-8 m tall." [Combretaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Looking at Plants. (2018). <i>Conocarpus erectus</i> . http://looking-at-plants.com/plants_a_-_z/conocarpus_erectus . [Accessed 30 Jul 2018]	"DEER - Mostly resistant"
	Ehsen, S., Qasim, M., Abideen, Z., Rizvi, R. F., Gul, B., Ansari, R., & Khan, M. A. (2016). Secondary metabolites as anti-nutritional factors in locally used halophytic forage/fodder. <i>Pakistan Journal of Botany</i> , 48(2), 629-636	"Table 1. Taxonomic description of local fodder species used in this study." [Conocarpus erectus listed among presumably palatable fodder species]

405	Toxic to animals	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Useful Tropical Plants Database. (2018). <i>Conocarpus erectus</i> . http://tropical.theferns.info/viewtropical.php?id=Conocarpus+erectus . [Accessed 30 Jul 2018]	"Known Hazards - None known"
	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
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Howard, F.W., Pemberton, R.W., Hodges, G.S., Steinberg, B., McLean, D. & Liu, H. 2006. Host Plant Range of Lobate Lac Scale, <i>Paratachardina lobata</i> , in Florida. Proceedings of the Florida State Horticultural Society 119: 398-408	"Abstract. A list of host plant species of lobate lac scale, <i>Paratachardina lobata</i> (Chamberlin) (Hemiptera: Coccoidea: Kerriidae), in southern Florida was compiled from the authors' observations and records of the Florida State Collection of Arthropods. This scale insect was found on 307 plant species, nearly all of which are dicotyledonous trees, shrubs, or lianas. Hosts included plant species grown for fruits and as ornamentals, several weeds, and eighty three species native to southern Florida. In addition to tropical plants, which predominate in this region, it was found on many temperate zone plants whose ranges extend to southern Florida. Seventeen plant species were consistently highly infested at different sites, and are thus considered highly susceptible; of these, ten are plants native to Florida." ... "silver buttonwood (<i>Conocarpus erectus</i>), black-olive (<i>Bucida buceras</i>) and red bay (<i>Persea borbonia</i>) have remained only moderately infested at some sites since we initiated observations, but were highly infested at other sites."
	Gilman, E.F. & Watson, D.G. 1993. <i>Conocarpus erectus</i> - Buttonwood. Fact Sheet ST-179. Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. http://hort.ifas.ufl.edu/ . [Accessed 30 Jul 2018]	"Pests - Sucking insect secretions will result in problems with sooty mold on trees inland from the coast. Diseases - No diseases are of major concern."
	Jarrett, A. 2003. Ornamental Tropical Shrubs. Pineapple Press Inc., Sarasota, FL	"This common Florida plant is prone to scale insects and mealybugs, which encourage black, sooty mold, discoloring the pretty foliage. Green buttonwood (<i>Conocarpus erectus</i>) grows to 40' with a 30' canopy when grown as a tree and is more cold tolerant than its silver cousin. It's also resistant to insects, therefore reducing the sooty mold."
	Miller, J. W., & McRitchie, J. J. (1973). <i>Cylindrocladium scoparium</i> , causal agent of a new disease of silver buttonwood and its control. Plant Disease Reporter 57: 500-503	<i>Cylindrocladium scoparium</i> is known as a pathogen of about 200 host plants, including <i>Acacia</i> spp. <i>Eucalyptus</i> spp., <i>Macadamia integrifolia</i> , <i>Persea americana</i> [broad host range]

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes

Qsn #	Question	Answer
	Useful Tropical Plants Database. (2018). <i>Conocarpus erectus</i> . http://tropical.theferns.info/viewtropical.php?id=Conocarpus+erectus . [Accessed 30 Jul 2018]	"Known Hazards - None known"
	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
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Florida Department of Community Affairs and Florida Department of Agriculture and Consumer Services. (2004). Wildfire Mitigation in Florida. Land use planning strategies and best development practices. Florida Department of Community Affairs, Tallahassee, FL	"Less-Flammable Plants for Florida Landscapes" [Includes Buttonwood (<i>Conocarpus erectus</i>)]

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"Button mangrove is intolerant of shade. It is almost always open-grown or in codominant stands. It will tolerate competition by plants of similar size but will not grow under the canopy of taller trees."
	Jarrett, A. 2003. Ornamental Tropical Shrubs. Pineapple Press Inc., Sarasota, FL	"Exposure: full sun"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Jarrett, A. 2003. Ornamental Tropical Shrubs. Pineapple Press Inc., Sarasota, FL	" <i>Conocarpus erectus</i> var. <i>sericeus</i> " ... "Soil: tolerant of most" ... "Buttonwoods are great plants for inhospitable conditions, as they are tolerant of drought, wind, poor drainage, and high salinity."
	Gilman, E.F. & Watson, D.G. 1993. <i>Conocarpus erectus</i> - Buttonwood. Fact Sheet ST-179. Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. http://hort.ifas.ufl.edu/ . [Accessed 30 Jul 2018]	"Soil tolerances: clay; loam; sand; acidic; occasionally wet; alkaline; well-drained" ... "A Florida native, Buttonwood is ideal for seaside plantings as it is highly tolerant of full sun, sandy soils, and salty conditions. It also tolerates brackish areas and alkaline soils, thriving in the broken shade and wet soils of hammocks. This is a tough tree!"

411	Climbing or smothering growth habit	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Shrubs or trees 3-8 m tall."

412	Forms dense thickets	y
	Source(s)	Notes
	Tomlinson, P.B. (1994). The Botany of Mangroves. Cambridge University Press, Cambridge, UK	"In South Florida, for instance, it can form almost pure stands in saline marly soils, but it also occupies low hammocks inland, commonly as a fringe to open ponds or artificial canals in the company of <i>Salix</i> , <i>Chrysobalanus</i> , and <i>Myrica</i> ."

501	Aquatic	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Shrubs or trees 3-8 m tall." ... "in Hawai'i cultivated and sparingly naturalized in coastal areas"
	Tomlinson, P.B. (1994). The Botany of Mangroves. Cambridge University Press, Cambridge, UK	"The species is frequently considered a "true" mangrove, but it is better regarded as a mangrove associate because it lacks any of the morphological and biological features (such as pneumatophores and vivipary) that characterize true mangroves; furthermore, it occurs in inland communities. The point is somewhat pedantic, however, the tree's somewhat weedy tendencies in part account for its mangrove association. In the mangrove community, <i>Conocarpus</i> is a back-mangal constituent, but only within the limits of the highest tides."

502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 29 Jul 2018]	Family: Combretaceae Subfamily: Combretoideae Tribe: Combreteae Subtribe: Terminaliinae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 29 Jul 2018]	Family: Combretaceae Subfamily: Combretoideae Tribe: Combreteae Subtribe: Terminaliinae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes

Qsn #	Question	Answer
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Shrubs or trees 3-8 m tall."
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnic descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"The species is usually a shrub 1.5 to 4 m in height but can become a tree up to 20 m or more in height. The root system consists mainly of laterals and fine roots that are dark brown, weak and brittle, and have a corky bark."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Gargiullo, M.B., Magnuson, B.L & Kimball, L.D. 2008. A Field Guide to Plants of Costa Rica. Oxford University Press US, New York, NY	"Flowers greenish white, tiny, radially symmetrical, stamens longer than petals; in branching clusters of small, dense heads, about 0.5 cm wide, at ends of branches; blooms and fruits most of the year."
	Ellison, A., Farnsworth, E. & Moore, G. (2010). <i>Conocarpus erectus</i> . The IUCN Red List of Threatened Species 2010: e.T178806A7612125. http://dx.doi.org/10.2305/IUCN.UK.2010-2.RLTS.T178806A7612125.en . [Accessed 30 Jul 2018]	[No evidence] "This species is widespread and tolerant of a variety of habitats. Relative to the other mangrove species within the wider Caribbean, the conservation status of this species appears to be more stable. However, this species is threatened by the loss of mangrove habitat throughout its range, primarily due to extraction and coastal development, and there has been an estimated 17% decline in mangrove area within this species range since 1980. Mangrove species are more at risk from coastal development and extraction at the extremes of their distribution, and are likely to be contracting in these areas more than in other areas. It is also likely that changes in climate due to global warming will further affect these parts of the range. Although there are overall range declines in many areas, they are not enough to reach any of the threatened category thresholds. This species is listed as Least Concern."

602	Produces viable seed	y
	Source(s)	Notes
	Gargiullo, M.B., Magnuson, B.L & Kimball, L.D. 2008. A Field Guide to Plants of Costa Rica. Oxford University Press US, New York, NY	"Flowers greenish white, tiny, radially symmetrical, stamens longer than petals; in branching clusters of small, dense heads, about 0.5 cm wide, at ends of branches; blooms and fruits most of the year. Fruit dry, very small, round, reddish with 2 wings, in small conelike, warty structures, 1–1.5 cm wide."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Fruit densely clustered into brownish subglobose heads 1-1.5 cm long, each one 3-3.5 mm long, recurved at apex and often with the persistent calyx."
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	Buttonwood is easily propagated by seed, 3-4" long woody cuttings, and air layers; silver buttonwood, on the other hand must be propagated by vegetative means, since It does not come true from seed."

603	Hybridizes naturally	

Qsn #	Question	Answer
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Unknown if species can hybridize] "A genus of 2 species, one of the Neotropics and tropical western Africa and the other of Saudi Arabia and Somaliland, eastern Africa."

604	Self-compatible or apomictic	
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Although buttonwood flowers have both staminate and pistillate parts, only one set is functional in flowers on a given tree; thus, trees are either male or female. Male plants are preferable as street and shade trees because they do not generate litter from falling cones."
	Nadia, T. d. L., & Machado, I. C. (2014). Interpopulation variation in the sexual and pollination systems of two Combretaceae species in Brazilian mangroves. Aquatic Botany, 114, 35-41	[Described as self-compatible & autogamous, in contrast to Staples & Herbst 2005] "Among mangroves, sexual divergence is already known in <i>Laguncularia racemosa</i> C.F. Gaertn., with hermaphroditic and androdioecious populations, and there are records of dioecy for <i>Conocarpus erectus</i> L. However, populations of these species in the northern coast of Pernambuco, Brazil, bear fruits in all individuals, a fact that eliminates the possibility of androdioecy and dioecy." ... "The population of <i>L. racemosa</i> and <i>C. erectus</i> were gynodioecious and andromonoecious, respectively, which is a novelty. Moreover <i>C. erectus</i> flowers also presenting protogyny." ... "There was a partition of pollinators between these species and reproductive efficiency was high, possibly resulting from the fact that both species are self-compatible and autogamous. However, reproductive success was higher in the presence of pollinators."

Qsn #	Question	Answer
605	Requires specialist pollinators	n
	Source(s)	Notes
	Nadia, T. d. L., & Machado, I. C. (2014). Interpopulation variation in the sexual and pollination systems of two Combretaceae species in Brazilian mangroves. <i>Aquatic Botany</i> , 114, 35-41	"The population of <i>L. racemosa</i> and <i>C. erectus</i> were gynodioecious and andromonoecious, respectively, which is a novelty. Moreover <i>C. erectus</i> flowers also presenting protogyny. Both species were generalistic, as several insect groups pollinated them. There was a partition of pollinators between these species and reproductive efficiency was high, possibly resulting from the fact that both species are self-compatible and autogamous. However, reproductive success was higher in the presence of pollinators." ... "The flowers of <i>L. racemosa</i> and <i>C. erectus</i> were visited by 12 and 27 insect species, respectively, including flies, wasps, bees, butter-flies, and diurnal moths" ... "Flies were the most frequent visitors: <i>Palpada albifrons</i> was responsible for 47% of all of visits in <i>L. racemosa</i> and for 71% in <i>C. erectus</i> (Fig. 4). Butterflies and moths were the second most frequent pollinator group in <i>C. erectus</i> , whereas bees of the family Halictidae were more frequent in <i>L. racemosa</i> (Fig. 4). In contrast, bees showed the lowest frequency of visits in <i>C. erectus</i> "
	FAO. (1994). <i>Mangrove Forest Management Guidelines</i> . Food and Agriculture Organization of the United Nations, Rome	"There are no honeybees native to the Americas, Australia or the Pacific area although during the last 400 years or so <i>Apis mellifera</i> has been introduced from Europe to these areas (Bradbear, 1990). <i>Avicennia germinans</i> , <i>Laguncularia racemosa</i> and <i>Conocarpus erectus</i> are important sources of nectar and pollen in these areas..."

606	Reproduction by vegetative fragmentation	
	Source(s)	Notes
	Hooker, W. J. (2011). <i>Niger Flora: Or, An Enumeration of the Plants of Western Tropical Africa</i> . Cambridge University Press, Cambridge, UK	"According to Vogel, the woody stems of this species spread over the ground for a considerable space, sending up a number of erect branches." [Might be able to spread vegetatively if branches contact ground]
	Little, Jr. E.L. & Wadsworth, F.H. (1964). <i>Common trees of Puerto Rico and the Virgin Islands</i> . Agriculture Handbook No. 249. USDA Forest Service, Washington, D.C	"it is reported that plants can be propagated from cuttings as living fenceposts." [but no evidence of natural vegetative spread]

607	Minimum generative time (years)	2
	Source(s)	Notes
	Hernandez, C., & Guadalupe de la Lanza Espino. (1999). <i>Ecología, Producción y Aprovechamiento del Mangle Conocarpus erectus L., en Barra de Tecoanapa Guerrero, Mexico</i> . <i>Biotropica</i> , 31(1), 121-134	[Reaches maturity from 25-28 months, between 2-3 years] "Flowering and fruiting are continuous but seed viability is (<12%). This is more critical during the dry season when <5 percent of seed germinates and only 1.6 percent of seedlings survive to form flowers after 25-28 mo."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Allen, J. (1998). <i>Mangroves as alien species: the case of Hawaii</i> . <i>Global Ecology & Biogeography Letters</i> , 7(1), 61-71	"In marked contrast to <i>R. mangle</i> , <i>B. gymnorrhiza</i> and <i>C. erectus</i> have shown little tendency to spread beyond their original planting sites (Fosberg, 1948; Wester, 1981; personal observations)."

Qsn #	Question	Answer
	Little, Jr. E.L. & Wadsworth, F.H. (1964). Common trees of Puerto Rico and the Virgin Islands. Agriculture Handbook No. 249. USDA Forest Service, Washington, D.C	"The dry individual fruits (drupes) are brown, 2-winged, overlapping and separating at maturity. Flowering and fruiting probably through the year." [No means of external attachment]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Parker, J.L. & Parsons, B. (2012). New plant records from the Big Island for 2009. Bishop Museum Occasional Papers 113: 55–63	"Button mangrove is very popular as a street and shade tree on the island, but we rarely see it naturalizing in cultivation as male trees are preferred in large plantings because they generate less litter than female trees (Staples & Herbst 2005)."
	Allen, J. (1998). Mangroves as alien species: the case of Hawaii. <i>Global Ecology & Biogeography Letters</i> , 7(1), 61-71	" <i>C. erectus</i> has been introduced at least twice (Wester, 1981) and the variety (<i>C. erectus</i> var. <i>sericeus</i> Griseb.) is still commonly planted as an ornamental. Both forms of <i>C. erectus</i> have escaped cultivation and established small wild populations on some islands."
	Allen, J. A., & Krauss, K. W. (2006). Influence of propagule flotation longevity and light availability on establishment of introduced mangrove species in Hawai'i. <i>Pacific Science</i> , 60(3), 367-376	" <i>Conocarpus erectus</i> is widely used ornamentally, and planting stock is commercially available, so its movement from O'ahu to Kaua'i, Lana'i, and Maui may well have been human-assisted."
	Francis, J. K. (ed.). 2004. <i>Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1</i> . Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"The species has been planted widely as an ornamental and has naturalized in at least Hawaii"

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Allen, J. (1998). Mangroves as alien species: the case of Hawaii. <i>Global Ecology & Biogeography Letters</i> , 7(1), 61-71	" <i>B. gymnorrhiza</i> and <i>C. erectus</i> have shown little tendency to spread beyond their original planting sites (Fosberg, 1948; Wester, 1981; personal observations)."
	WRA Specialist. 2018. Personal Communication	No evidence found. <i>C. erectus</i> is a landscaping tree grown in coastal sites, & is unlikely to contaminate produce or other commodities

704	Propagules adapted to wind dispersal	
	Source(s)	Notes
	Little, Jr. E.L. & Wadsworth, F.H. (1964). Common trees of Puerto Rico and the Virgin Islands. Agriculture Handbook No. 249. USDA Forest Service, Washington, D.C	"The dry individual fruits (drupes) are brown, 2-winged, overlapping and separating at maturity. Flowering and fruiting probably through the year." [Possible that winged fruit aid in wind dispersal, but distribution & ecology suggest water as the primary dispersal vector]

705	Propagules water dispersed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Buttonwood was introduced to the Hawaiian Islands early in the 1900s and today is cultivated and sparingly naturalized in coastal areas on several islands, its spread aided by easy dispersibility of the seeds by ocean currents."
	Ellison, A., Farnsworth, E. & Moore, G. (2010). <i>Conocarpus erectus</i> . The IUCN Red List of Threatened Species 2010: e.T178806A7612125. http://dx.doi.org/10.2305/IUCN.UK.2010-2.RLTS.T178806A7612125.en . [Accessed 30 Jul 2018]	" <i>C. erectus</i> has non-viviparous seeds which float and can be dispersed by water. Seed production is high but many are aborted or do not germinate (Tomlinson 1986)"

706	Propagules bird dispersed	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Fruit scale-like, coriaceous, obcordate, laterally compressed and 2-winged." [Not fleshy-fruited]

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Fruit scale-like, coriaceous, obcordate, laterally compressed and 2-winged." [No means of external attachment]

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Fruit scale-like, coriaceous, obcordate, laterally compressed and 2-winged." [No evidence of consumption by animals or internal dispersal]

801	Prolific seed production (>1000/m2)	y
	Source(s)	Notes
	Hernandez, C., & Guadalupe de la Lanza Espino. (1999). Ecologia, Produccion y Aprovechamiento del Mangle <i>Conocarpus erectus</i> L., en Barra de Tecuanapa Guerrero, Mexico. <i>Biotropica</i> , 31(1), 121-134	[Translation from Spanish: 7441-23267 seeds/square meter] "El numero de semillas/ m2 en ambos sitios para los meses de marzo y junio fue de 7441 y 23.267. Tambien se calcul6 el numero aproximado de semillas producidas por cada irbol para estos meses, tomando en cuenta el area foliar de 50 irboles de los dos sitios; esta area fue de 7.2 m2 la producci6n por arbol fue de aproximadamente 68.456 y 214.000, respectivamente."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Royal Botanic Gardens Kew. (2018) Seed Information Database (SID). Version 7.1. Available from: http://data.kew.org/sid/ . [Accessed 30 Jul 2018]	"Storage Behaviour: Orthodox Storage Conditions: 75 % viability following drying to mc's in equilibrium with 15 % RH and freezing for 15 days at -20C at RBG Kew, WP"

Qsn #	Question	Answer
	Hernandez, C., & Guadalupe de la Lanza Espino. (1999). Ecologia, Produccion y Aprovechamiento del Mangle <i>Conocarpus erectus</i> L., en Barra de Tecoanapa Guerrero, Mexico. <i>Biotropica</i> , 31(1), 121-134	No direct evidence, however seed production is continuous throughout the year producing large numbers of small seeds with low germination and survival rate.

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Parker, J.L. & Parsons, B. (2012). New plant records from the Big Island for 2009. <i>Bishop Museum Occasional Papers</i> 113: 55–63	"Button mangrove is very popular as a street and shade tree on the island ... "The plant was a resprout from a large stump and had no flowers or fruit, but it was positively identified by Bishop Museum."
	Ellison, A., Farnsworth, E. & Moore, G. (2010). <i>Conocarpus erectus</i> . The IUCN Red List of Threatened Species 2010: e.T178806A7612125. http://dx.doi.org/10.2305/IUCN.UK.2010-2.RLTS.T178806A7612125.en . [Accessed 30 Jul 2018]	"The stems can sprout vegetatively (post hurricane) but experimental rooting success of cuttings was shown to be limited (Benitez-Pardo et al. 2002)."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Unknown] "in Hawai'i cultivated and sparingly naturalized in coastal areas"

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Naturalized on Kauai, Oahu, Lanai, Maui, & Hawaii (Hawaiian Islands)
- Tolerates many soil types
- Capable of forming almost pure stands in native range
- Reproduces by seeds
- May be self-compatible (but also reported to be functionally dioecious)
- Seeds dispersed by water & intentionally cultivated by people
- Prolific seed production (at least in native range)
- Able to coppice & resprout after cutting or hurricane damage

Low Risk Traits

- No reports of negative impacts where naturalized
- Unarmed (no spines, thorns, or burrs)
- Requires full sun
- Ornamental & landscaping uses
- May be functionally dioecious (but also reported to be andromonoecious & self-compatible)
- Not reported to spread far from planting sites (at least in terrestrial sites)

Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> Yes. Capable of forming pure stands in native range. A light demanding tree & presumably shade intolerant

(B) Bird- or clearly wind-dispersed?> Unknown. Winged seeds may facilitate dispersal by wind

Outcome = Evaluate