

Taxon: Cordia lutea Lam.	Family: Boraginaceae
Common Name(s): Spanish muyuyo muyuyo yellow cordia yellow geiger	Synonym(s): Cordia marchionica Drake Cordia rotundifolia Ruiz & Pav.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 25 Feb 2019
WRA Score: 5.0	Designation: EVALUATE	Rating: Evaluate

Keywords: Tropical Tree, Naturalized, Limited Autogamy, Fleshy-Fruit, Bird-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	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)	n
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		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n
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		
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	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
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		
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m ²)	y=1, n=-1	n
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		
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
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	[No evidence of domestication] "Range: Native; also known from mainland Ecuador and Peru."

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
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 23 Feb 2019]	"Native Southern America WESTERN SOUTH AMERICA: Colombia, Ecuador (incl. Galapagos), Peru"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 23 Feb 2019]	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Cotler, H., & Maass, J. (1999). Tree Management in the Northwestern Andean Cordillera of Peru. Mountain Research and Development, 19(2), 153-160	"A large proportion of the species (42.6%) have a restrictive distribution between 100 and 500 m e. g. A. Americana, C. Spinosa, C. mollis, C. montana, T. peruviana, and C. lutea."
	Dave's Garden. (2019). Cordia Species, Yellow Geiger, Muyuyo - Cordia lutea. https://davesgarden.com/guides/pf/go/68043/ . [Accessed 24 Feb 2019]	"Hardiness: USDA Zone 9a: to -6.6 °C (20 °F) USDA Zone 9b: to -3.8 °C (25 °F) USDA Zone 10a: to -1.1 °C (30 °F) USDA Zone 10b: to 1.7 °C (35 °F) USDA Zone 11: above 4.5 °C (40 °F)"
	Treeworld Wholesale. 2019. Cordia lutea. http://treeworldwholesale.com . [Accessed 24 Feb 2019]	"Zone Range : 9 - 11"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 23 Feb 2019]	"Native Southern America WESTERN SOUTH AMERICA: Colombia, Ecuador (incl. Galapagos), Peru"
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	"Range: Native; also known from mainland Ecuador and Peru."

205	Does the species have a history of repeated introductions outside its natural 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	"The yellow-flowered Geiger tree is not well known from the Hawaiian Islands but reportedly grows in the living collections at the Koko Crater Botanical Garden on O'ahu and the national Tropical Botanical Garden on Kaua'i (C. Imada, pers. comm.). on the Big Island, this shrub was found naturalizing in a new subdivision on a hill in lava rock substrate. This species has only been observed once in our surveys and was found heavily fruiting and naturalizing downslope from a planting. This species is likely to gain in popularity with its ever-blooming habit and sandpapery leaves. Material examined. HAWAII: north Kona Distr. Hualālai Rd, 2173109n 189218e. shrub with yellow flowers and scabrous leaves. Fruit a white, fleshy drupe. Growing on a rocky hillside, 27 may 2009, J. Parker & R. Parsons BIED82."
	Stebbins, M. 1999. Flowering Trees of Florida. Pineapple Press Inc., Sarasota, FL	"This Cordia was introduced to Florida from Ecuador by the USDA. As a small tree growing up to 15 feet tall or as a spreading shrub, it produces clusters of yellow flowers (one inch across) throughout the summer. Rarely offered commercially, it can be seen at Fairchild Tropical Garden in Miami and at Marie Selby Botanical Gardens in Sarasota."

Qsn #	Question	Answer
	Dave's Garden. (2019). <i>Cordia</i> Species, Yellow Geiger, Muyuyo - <i>Cordia lutea</i> . https://davesgarden.com/guides/pf/go/68043/ . [Accessed 23 Feb 2019]	"This plant has been said to grow in the following regions: Vista, California Big Pine Key, Florida Cape Coral, Florida Pompano Beach, Florida Port Charlotte, Florida Port Saint Lucie, Florida West Palm Beach, Florida Chalmette, Louisiana Harlingen, Texas"

301	Naturalized beyond native range	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	"The yellow-flowered Geiger tree is not well known from the Hawaiian Islands but reportedly grows in the living collections at the Koko Crater Botanical Garden on O'ahu and the national Tropical Botanical Garden on Kaua'i (C. Imada, pers. comm.). on the Big Island, this shrub was found naturalizing in a new subdivision on a hill in lava rock substrate. This species has only been observed once in our surveys and was found heavily fruiting and naturalizing downslope from a planting. This species is likely to gain in popularity with its ever-blooming habit and sandpapery leaves. Material examined. HAWAII: North Kona Distr. Hualālai Rd, 2173109n 189218e. shrub with yellow flowers and scabrous leaves. Fruit a white, fleshy drupe. Growing on a rocky hillside, 27 may 2009, J. Parker & R. Parsons BIED82."

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

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

304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

305	Congeneric weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Edward, E., Munishi, P., & Hulme, P. (2009). Relative Roles of Disturbance and Propagule Pressure on the Invasion of Humid Tropical Forest by <i>Cordia alliodora</i> (Boraginaceae) in Tanzania. <i>Biotropica</i> , 41(2), 171-178	" <i>C. alliodora</i> poses a significant threat to the East Usambaras as well as other humid forests where it is promoted for agroforestry."
	CABI. (2019). <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	[<i>Cordia alliodora</i> & <i>Cordia obliqua</i>] " <i>C. obliqua</i> is a perennial fastgrowing small tree included in the Global Compendium of Weeds (Randall, 2012). This species has been intentionally introduced throughout the tropics where it is cultivated mostly for its fruits. It produces yellow or pinkish-yellow shining drupes which are dispersed by birds and by humans when they consume its fruits. <i>C. obliqua</i> has been listed as invasive in Cuba and Puerto Rico where it is principally invading coastal areas, coastal hills, open forests, and thickets (Kairo et al., 2003; Oviedo Prieto et al., 2012; Rojas-Sandoval and Acevedo-Rodriguez, 2014). In Cuba it is listed as one of the 100 worst invasive species for the island and it is also considered an environmental transformer species (Oviedo Prieto et al., 2012). " ... "Introduced <i>C. alliodora</i> has been found to be associated with invasion events in Tonga and Vanuatu (Haysom and Murphy, 2003). In Vanuatu, use of the young plantations for pasture, as was common practice under coconuts, with overgrazing in the dry season, left areas of bare soil ideal for regeneration of <i>C. alliodora</i> (Tolfts, 1997; Tschinkel, 1965). A mass of <i>C. alliodora</i> seedlings grew up, eliminating ground cover and spreading to neighbouring pastures where these were overgrazed. Only a very small area has been affected outside the plantations, but this is potentially an expensive problem for local cattle producers. Within its native range, <i>C. alliodora</i> is a successful colonizer of disturbed sites (e.g. pasture, coffee, cocoa), sometimes forming monospecific stands. There is, however, no record of weediness, probably owing to the poorer soil conditions (nutrients, compaction etc.) into which it is dispersed. Given <i>C. alliodora</i> 's ecological characteristics, its capacity to invade undisturbed closed forest habitats is probably limited. The restrictions in its use as an exotic are more likely to be related to its limitations as a plantation species rather than its potential as a weed."
	Richardson, D. M. (1998). Forestry trees as invasive aliens. <i>Conservation biology</i> , 12(1), 18-26	[<i>Cordia alliodora</i>] "In the Galapagos archipelago, for example, four alien trees are highly invasive in natural systems. Two of these (<i>Cedrela odorata</i> and <i>Cordia alliodora</i>) were introduced for timber, one for its fruits (<i>Psidium guajava</i>), and one for quinine (<i>Cinchona succirubra</i>)."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	McMullen, C.K. 1999. <i>Flowering plants of the Galápagos</i> . Cornell University Press, Ithaca, NY	[No evidence] "Small tree or shrub to 8 m tall, young branches covered with hairs. Leaves alternate, simple; blade ovate to somewhat roundish, 4-10 cm long, upper surface rough, lower surface hairy, margins minutely crenate. Flowers in cymes; corolla yellow, funnelform with 5-8 lobes, 2-4 cm across; stamens 5-8. Fruit a drupe, white, roundish, 8-12 mm across; seeds 1-4."

402	Allelopathic	
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Qsn #	Question	Answer
	Source(s)	Notes
	Appiah, K., Li, Z., Zeng, R. S., Luo, S., Oikawa, Y., & Fujii, Y. (2015). Determination of allelopathic potentials in plant species in Sino-Japanese floristic region by sandwich method and dish pack method. <i>International Journal of Basic and Applied Sciences</i> , 4(4), 381-394	[Unknown. Related taxon exhibits a strong inhibitory effect on lettuce seedlings] "Eight other species (<i>Cordia dichotoma</i> , <i>Asarum nipponicum</i> , <i>Bischofia polycarpa</i> , <i>Mahonia lomariifolia</i> , <i>Taxus wallichiana</i> , <i>Magnolia liliiflora</i> , <i>Hemerocallis fulva</i> , and <i>Acronychia pedunculata</i>) showed strong inhibitory activity on lettuce seedling with radicle elongation in the range of 29.5-39.8% of the untreated control for 10 mg treatment." ... "In the Boraginaceae family, <i>Cordia dichotoma</i> had the highest inhibition on lettuce radicle elongation."

403	Parasitic	n
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	"Small tree or shrub to 8 m tall" [Boraginaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Blake, S., Guézou, A., Deem, S. L., Yackulic, C. B., & Cabrera, F. (2015). The Dominance of Introduced Plant Species in the Diets of Migratory Galapagos Tortoises Increases with Elevation on a Human-Occupied Island. <i>Biotropica</i> , 47(2), 246-258	"TABLE 1. Plants by family and species recorded in the diet of Galapagos tortoises on Santa Cruz Island (CF and LR refer to the Cerro Fatal and La Reserva tortoise populations, respectively). N feeding bouts refers to the number of records of tortoises feeding on a given species during focal observations" [<i>Cordia lutea</i> present in one feeding bout]
	Mueller-Dombois, D. & Fosberg, F. R. 1998. Vegetation of the tropical Pacific islands. Springer-Verlag, New York, NY	[<i>Cordia lutea</i> persists in areas where other plants have been eliminated by herbivores, suggesting low palatability] "The Marquesas ... These dry slopes have been devastated by the grazing and trampling of feral herbivores, and only a few scattered trees of <i>Casuarina</i> , <i>Pisonia</i> , and <i>Ficus</i> remain. Shrubs (except <i>Cordia lutea</i> , not commonly eaten) and the more palatable grasses are practically gone." ... "Eiao Island ... On sea cliffs, <i>Leptochloa xerophila</i> , <i>Heliotropium marchionicum</i> , and <i>Cordia lutea</i> persisted out of reach of grazing animals. Forest elements seen on the east side contained <i>Cordia lutea</i> , <i>Pandanus</i> , and <i>Pisonia grandis</i> , with some <i>Aleurites</i> in gulches. Except for <i>Cordia lutea</i> and <i>Pityrogramma calomelanos</i> , most of the forest remnants seem to be confined to gulches, cliffs, and other sites difficult for herbivorous animals to access."

Qsn #	Question	Answer
405	Toxic to animals	n
	Source(s)	Notes
	Mayevych, I., & Cabanillas, J. (2015). Chemical composition of <i>Cordia lutea</i> L.: absence of pyrrolizidine alkaloids. <i>Natural Products Chemistry & Research</i> 3(6): http://dx.doi.org/10.4172/2329-6836.1000194 . [Accessed]	[No evidence] " <i>Cordia lutea</i> is known for its medicinal value. This paper deals with a phytochemical investigation of this species, from which rutin, quercetin, linolenic acid, hexadecanoic acid and hexadecanoic acid glyceryl ester have been isolated as main the components. Alkaloids were not detected (UPLC-MS), indicating the absence of pyrrolizidine alkaloids (PAs). The absence of PAs in <i>C. lutea</i> implies no PAs toxicological risk for this plant."
	Quattrocchi, U. 2012. <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Treeworld Wholesale. 2019. <i>Cordia lutea</i> . http://treeworldwholesale.com . [Accessed 24 Feb 2019]	"No pest or disease problems are reported."
	Cheng, Z., & Bhandari, B. P. (2015). Biology, Management, and Updated Host Range of the Lobate Lac Scale (<i>Paratachardina pseudolobata</i>) in Hawai'i's Urban Landscapes. <i>Insect Pests</i> 34. College of Tropical Agriculture and Human Resources, University of Hawai'i Manoa, Honolulu, HI	"Table 1. Host Plants of Lobate Lac Scale on UH-Manoa Campus" [Cordia lutea included among 83 documented host plants]
	Caldwell, D. (2005). Observations on some insect pests of woody ornamentals: black olive caterpillar, Geiger tree tortoise beetle and cycad aulacaspis scale in Naples, Florida. <i>Proc. Fla. State Hort. Soc.</i> 118: 322-325	"The Geiger tree tortoise beetle, <i>Physonota</i> (<i>Eurypepla</i>) <i>calochroma floridensis</i> feeds on the orange flowering Geiger tree. It has overlapping generations and can probably be found almost anytime." ... "Host. The Geiger tree (<i>Cordia sebestena</i> L. : <i>Boraginaceae</i>) is the principal host. Other <i>Cordia</i> species, which are occasionally found in the landscape, are not suitable for this beetle. These include the white flowering, wild-olive (<i>Cordia boissieri</i> Lam.), a yellow flowering shrub (<i>Cordia lutea</i> A. DC.) and bloodberry (<i>Cordia globosa</i> (Jacq.) H.B.K.)."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Mayevych, I., & Cabanillas, J. (2015). Chemical composition of <i>Cordia lutea</i> L.: absence of pyrrolizidine alkaloids. <i>Natural Products Chemistry & Research</i> 3(6): http://dx.doi.org/10.4172/2329-6836.1000194 . [Accessed]	[No evidence] " <i>Cordia lutea</i> is known for its medicinal value. This paper deals with a phytochemical investigation of this species, from which rutin, quercetin, linolenic acid, hexadecanoic acid and hexadecanoic acid glyceryl ester have been isolated as main the components. Alkaloids were not detected (UPLC-MS), indicating the absence of pyrrolizidine alkaloids (PAs). The absence of PAs in <i>C. lutea</i> implies no PAs toxicological risk for this plant."
	Quattrocchi, U. 2012. <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	No evidence

Qsn #	Question	Answer
408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	"Habitat: Arid lowlands" [Unknown. No evidence, but may contribute to fuel load in arid habitats that may be prone to fire]

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Rauch, F.D. & Weissich, P.R. 2009. Small Trees for the Tropical Landscape. University of Hawaii Press, Honolulu, HI	"Plant it in full sun in a well-drained soil. It is very drought tolerant and will withstand moderate amounts of salt."
	Dave's Garden. (2019). Cordia Species, Yellow Geiger, Muyuyo - Cordia lutea. https://davesgarden.com/guides/pf/go/68043/ . [Accessed 23 Feb 2019]	"Sun Exposure: Full Sun"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Dave's Garden. (2019). Cordia Species, Yellow Geiger, Muyuyo - Cordia lutea. https://davesgarden.com/guides/pf/go/68043/ . [Accessed 24 Feb 2019]	"Soil pH requirements: 6.1 to 6.5 (mildly acidic) 6.6 to 7.5 (neutral) 7.6 to 7.8 (mildly alkaline)"
	Treeworld Wholesale. 2019. Cordia lutea. http://treeworldwholesale.com . [Accessed 24 Feb 2019]	"Tolerates a range of soil types, well drained, needs regular watering for good growth."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	"Small tree or shrub to 8 m tall"

412	Forms dense thickets	
	Source(s)	Notes
	Cotler, H., & Maass, J. (1999). Tree Management in the Northwestern Andean Cordillera of Peru. Mountain Research and Development, 19(2), 153-160	[Occurs in dense shrubland with other vegetation] "Dense shrubland with isolated trees, consisting mainly of Salix humboldthiana Willd. , Opuntia ficus-indica L. Muller, Escallonia pendula (R. &P.) Pers. , Cercidium praecox (R.&P.) Harms, Baccharis latifolia (R. &P.) Pers. , Pso-ralea glandulosa L. , Cordia Lutea Lam. , Caesalpinia spinose (Molina) Kuntz, and Lupinus ballianus C. P. Smith."
	Svenson, H. (1946). Vegetation of the Coast of Ecuador and Peru and Its Relation to that of the Galapagos Islands. II. Catalogue of Plants. American Journal of Botany, 33(6), 427-498	[Thickets of Cordia lutea described. Densities, or ability to exclude other vegetation unknown] "HELIOTROPIUM ANGIOSPERMUM Murray, Prodr. Stirp. 217. 1770. H. parviflorum L. Mant. 2: 201. 1771. A weedy perennial (sometimes annual) with .small white flowers, the spikes usually 2 (sometimes 3) together, in thickets of Cordia lutea, Salinas (11,153) ;"

Qsn #	Question	Answer
501	Aquatic	n
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	[Terrestrial tree] "Small tree or shrub to 8 m tall"

Qsn #	Question	Answer
502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 23 Feb 2019]	"Family: Cordiaceae Alternate family(ies): Boraginaceae, Ehretiaceae"

Qsn #	Question	Answer
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 23 Feb 2019]	"Family: Cordiaceae Alternate family(ies): Boraginaceae, Ehretiaceae"

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	"Small tree or shrub to 8 m tall, young branches covered with hairs. Leaves alternate, simple; blade ovate to somewhat roundish, 4-10 cm long, upper surface rough, lower surface hairy, margins minutely crenate."

Qsn #	Question	Answer
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 25 Feb 2019]	"Southern America WESTERN SOUTH AMERICA: Colombia, Ecuador (incl. Galapagos), Peru"

Qsn #	Question	Answer
602	Produces viable seed	y
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	"Fruit a drupe, white, roundish, 8-12 mm across; seeds 1-4."
	Dave's Garden. (2019). <i>Cordia</i> Species, Yellow Geiger, Muyuyo - <i>Cordia lutea</i> . https://davesgarden.com/guides/pf/go/68043/ . [Accessed 23 Feb 2019]	"Propagation Methods: From semi-hardwood cuttings From seed; direct sow after last frost Seed Collecting: Remove fleshy coating on seeds before storing"

Qsn #	Question	Answer
	McMullen, C. K. (2012). Pollination of the heterostylous Galápagos native, <i>Cordia lutea</i> (Boraginaceae). <i>Plant Systematics and Evolution</i> , 298(3), 569-579	"There was no significant difference in fruit set or seed set between flowers experiencing diurnal pollination and nocturnal pollination, although there was a trend toward greater seed set resulting from nocturnal pollination."

603	Hybridizes naturally	
	Source(s)	Notes
	Miller, J. S. (1985). Hybridization in <i>Cordia</i> section <i>Varronia</i> (Boraginaceae). <i>Cordia</i> section <i>Varronia</i> . <i>American Journal of Botany</i> , 72(6): 963	[Unknown. Hybridization documented in genus] " <i>Cordia</i> section <i>Varronia</i> is a group of 50-60 species of shrubs which are widespread in the Neotropics. Treatments of this section in the past have varied widely in the circumscription of species. Field and herbarium studies indicate that natural hybrids are commonly produced between many species of this group. Some of these hybrids have been described as new species by authors in the past, adding to the confusion in this group. Hybrids between such distantly related species as <i>Cordia curassavica</i> and <i>Cordia bullata</i> produce no viable pollen and appear to be sterile. They may however, persist vegetatively. Hybrids between closely related species such as <i>Cordia globosa</i> and <i>Cordia bullata</i> are variable in pollen stainability but always produce some stainable pollen. These hybrids often backcross with parents and introgression may occur in areas where the species are sympatric. These groups have been analyzed both morphologically and in terms of leaf flavonoids and the data used to provide a better circumscription of species within the section."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	McMullen, C. K. (2012). Pollination of the heterostylous Galápagos native, <i>Cordia lutea</i> (Boraginaceae). <i>Plant Systematics and Evolution</i> , 298(3), 569-579	" <i>Cordia lutea</i> exhibits a mixed mating system, producing a relatively low level of fruits through a combination of self- and cross-pollination, facilitated by the relatively few insects that are available." ... "However, fruit yield resulting from autonomous autogamy, facilitated autogamy, and illegitimate hand cross-pollinations indicates that <i>C. lutea</i> does not exhibit complete heteromorphic self-incompatibility. The ability of <i>C. lutea</i> to produce fruit via autonomous autogamy (albeit only 4% fruit set) is a trait shared by many Galapagos angiosperms"

605	Requires specialist pollinators	n
	Source(s)	Notes
	McMullen, C. K. (2012). Pollination of the heterostylous Galápagos native, <i>Cordia lutea</i> (Boraginaceae). <i>Plant Systematics and Evolution</i> , 298(3), 569-579	"There was no significant difference in fruit set or seed set between flowers experiencing diurnal pollination and nocturnal pollination, although there was a trend toward greater seed set resulting from nocturnal pollination. Carpenter bees were the most effective diurnal pollinators, whereas moths were the most effective nocturnal pollinators. Of the two, moths are more efficient at transporting pollen from plant to plant."

606	Reproduction by vegetative fragmentation	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Dave's Garden. (2019). <i>Cordia</i> Species, Yellow Geiger, Muyuyo - <i>Cordia lutea</i> . https://davesgarden.com/guides/pf/go/68043/ . [Accessed 25 Feb 2019]	"Propagation Methods: From semi-hardwood cuttings From seed; direct sow after last frost"
	WRA Specialist. (2019). Personal Communication	No evidence. Other <i>Cordia</i> species can spread from fallen branches

607	Minimum generative time (years)	
	Source(s)	Notes
	Treeworld Wholesale. 2019. <i>Cordia lutea</i> . http://treeworldwholesale.com . [Accessed 25 Feb 2019]	"Growth Rate : MODERATE"
	Dave's Garden. (2019). <i>Cordia</i> Species, Yellow Geiger, Muyuyo - <i>Cordia lutea</i> . https://davesgarden.com/guides/pf/go/68043/ . [Accessed 25 Feb 2019]	[Anecdotal. One+ year old tree had not yet flowered in cultivation] "On Jun 23, 2004, LouisianaSweetPea from Mount Hermon, LA (Zone 8b) wrote: At the end of April, 2004, I purchased a very small one-year-old tree which was only about twelve inches tall. In two month's time, the little tree has shown good growth, although it is supposed to have a Medium growth rate." ... "The striking yellow blossoms are supposed to appear in clusters on the branch tips most of the year. I do not yet know how mature the tree must be to bloom."
	WRA Specialist. (2019). Personal Communication	Unknown. An earlier version of this assessment (completed in 2005), speculated 2 years to maturity for this tree, without any direct evidence.

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	"The fruits of this plant are well known for their fleshy pulp, which, when crushed, is at first slimy but soon becomes extremely sticky." [Sticky pulp may allow for external attachment and dispersal. Further evidence required]
	Fitter, J., Fitter, D. and Hosking, D. (2016). Wildlife of the Galápagos: Second Edition. Princeton University Press, Princeton, NJ	"The seed is surrounded by a sticky substance, which helps to ensure dispersion, and is also an excellent paper glue."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Stebbins, M. 1999. Flowering Trees of Florida. Pineapple Press Inc., Sarasota, FL	"This <i>Cordia</i> was introduced to Florida from Ecuador by the USDA. As a small tree growing up to 15 feet tall or as a spreading shrub, it produces clusters of yellow flowers (one inch across) throughout the summer. Rarely offered commercially, it can be seen at Fairchild Tropical Garden in Miami and at Marie Selby Botanical Gardens in Sarasota."

Qsn #	Question	Answer
	Dave's Garden. (2019). <i>Cordia</i> Species, Yellow Geiger, Muyuyo - <i>Cordia lutea</i> . https://davesgarden.com/guides/pf/go/68043/ . [Accessed 23 Feb 2019]	"This plant has been said to grow in the following regions: Vista, California Big Pine Key, Florida Cape Coral, Florida Pompano Beach, Florida Port Charlotte, Florida Port Saint Lucie, Florida West Palm Beach, Florida Chalmette, Louisiana Harlingen, Texas"

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	"Small tree or shrub to 8 m tall," ... "Fruit a drupe, white, roundish, 8-12 mm across; seeds 1-4." [No evidence. Unlikely]

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	[Bird-dispersed] "Fruit a drupe, white, roundish, 8-12 mm across; seeds 1-4."

705	Propagules water dispersed	
	Source(s)	Notes
	Svenson, H. (1946). Vegetation of the Coast of Ecuador and Peru and Its Relation to that of the Galapagos Islands. II. Catalogue of Plants. American Journal of Botany, 33(6), 427-498	[Occurs near rivers and coasts, suggesting seeds may be secondarily water-dispersed] "C. LUTEA Lam. Ill. 1: 421. 1791; C. rotundifolia R&P Fl. Peruv. 2: 24, t. 148a. 1799. Dwarf shrubs with large yellow flowers, in the windswept part of the Puntilla often flowering when less than a foot in height (11,155). River gravels near La Brea, Piura, Peru (H&S 11,596). This bush or small tree has the most conspicuous flowers to be seen in the Galapagos Islands, where it is a common species. Likewise on the coast of Ecuador and Peru it is a prominent feature of the landscape."

706	Propagules bird dispersed	y
	Source(s)	Notes
	Bouffard, L. A., & Brooks, D. M. (2014). The role of the white-winged guan (<i>Penelope albipennis</i>) in seed dispersal and predation in tumbesian dry forest, Peru. <i>Journal of Sustainable Forestry</i> , 33(2), 184-194	"Field observations show that this bird is a frugivore; <i>Cordia lutea</i> (Boraginaceae) was the primary fruit consumed of the eight species of seeds collected from droppings." ... "Collected seeds were sown in pots under nursery conditions and monitored for germination. Germination rates of passed seeds for <i>Cordia lutea</i> were compared to those that had been collected from a control group of trees. Germination was significantly different between fecal and control seeds, suggesting the plant germinated better after passing through the guans alimentary tract." ... "C. lutea has an egg-shaped, oblong fruit that is approximately 1 cm in length, allowing the guan to easily consume the fruit."

Qsn #	Question	Answer
	Traveset A., Heleno R., & Nogales M. 2013. The ecology of seed dispersal. Pp. 62–93 In R.S. Gallaguer (ed.), Seeds. The Ecology of Regeneration in Plant Communities, 3rd Edition. CABI, Oxfordshire, UK	"Fig. 3.1. Different stages of the seed dispersal process." ... "The granivorous large beak ground finch (<i>Geospiza magnirostris</i>) handling and dispersing the hard seed of <i>Cordia lutea</i> ."
	Guerrero, A. M., & Tye, A. (2011). Native and introduced birds of Galapagos as dispersers of native and introduced plants. <i>Ornitología Neotropical</i> , 22(2), 207-217	"For some fleshy-fruited Galapagos native plants such as the shrubs <i>Miconia robinsoniana</i> , <i>Tournefortia</i> spp., and <i>Cordia lutea</i> , relatively long-distance endochorous dispersal by at least the Galapagos Flycatcher, Galapagos Mockingbird, and Yellow Warbler, and now also by the introduced the Smooth-billed Ani, could be important in their population dynamics, with the ani perhaps having so-far undetermined impacts on the dispersion dynamics of native Galapagos plants. Seeds of these species may be commonly dispersed at least far enough to take them away from the parent plant, whereas occasional long-distance dispersal, even between islands, could result in major range changes, of great importance on an evolutionary time-scale."
	Nogales, M. et al. (2017). Contribution by vertebrates to seed dispersal effectiveness in the Galápagos Islands: a community-wide approach. <i>Ecology</i> , 98(8), 2049-2058	"TABLE 3. Seedling emergence results (seeds ingested by medium and small passerines)." [<i>Cordia lutea</i> germinated following ingestion by a medium passerine]
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	"The fruit is pleasingly sweet when first tasted, but soon becomes bitter. This may be a purely human assessment, as Galapagos mockingbirds (<i>Nesomimus parvulus</i>) appear quite fond of the fruits. Rats have also been observed feeding on the fruits, sometimes for hours at a time during the night."

707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	[Sticky pulp could allow fruit to adhere to animals] "The fruits of this plant are well known for their fleshy pulp, which, when crushed, is at first slimy but soon becomes extremely sticky."

Qsn #	Question	Answer
708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Bouffard, L. A., & Brooks, D. M. (2014). The role of the white-winged guan (<i>Penelope albipennis</i>) in seed dispersal and predation in tumbesian dry forest, Peru. <i>Journal of Sustainable Forestry</i> , 33(2), 184-194	"Field observations show that this bird is a frugivore; <i>Cordia lutea</i> (Boraginaceae) was the primary fruit consumed of the eight species of seeds collected from droppings." ... "Collected seeds were sown in pots under nursery conditions and monitored for germination. Germination rates of passed seeds for <i>Cordia lutea</i> were compared to those that had been collected from a control group of trees. Germination was significantly different between fecal and control seeds, suggesting the plant germinated better after passing through the guans alimentary tract."
	Blake, S. et al. (2012). Seed dispersal by Galápagos tortoises. <i>Journal of Biogeography</i> , 39(11), 1961-1972	"Table 1 Summary data indicating the frequency of occurrence of intact seeds in dung piles of tortoises (<i>Chelonoidis nigra</i>) found in farmland and in the Galápagos National Park on the island of Santa Cruz" [<i>Cordia lutea</i> seed found intact in tortoise dung]
	Nogales, M. et al. (2017). Contribution by vertebrates to seed dispersal effectiveness in the Galápagos Islands: a community-wide approach. <i>Ecology</i> , 98(8), 2049-2058	"TABLE 3. Seedling emergence results (seeds ingested by medium and small passerines)." [<i>Cordia lutea</i> germinated following ingestion by a medium passerine]

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	"Fruit a drupe, white, roundish, 8-12 mm across; seeds 1-4." [Few-seeded fruit produced. Unlikely to produce such high seed densities]
	Fitter, J., Fitter, D. and Hosking, D. (2016). Wildlife of the Galápagos: Second Edition. Princeton University Press, Princeton, NJ	"The bright-yellow trumpet-shaped flowers produce translucent berries each containing one seed."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Baskin, C.C. & Baskin, J.M. 2014. Seeds Ecology, Biogeography, and Evolution of Dormancy and Germination. Second Edition. Academic Press, San Francisco, CA	Unknown. Other <i>Cordia</i> species possess a range of seed dormancy traits (non-dormancy; physical dormancy)
	Royal Botanic Gardens Kew. (2019) Seed Information Database (SID). Version 7.1. Available from: http://data.kew.org/sid/ . [Accessed 25 Feb 2019]	Unknown. Other <i>Cordia</i> species possess orthodox seed storage

Qsn #	Question	Answer
803	Well controlled by herbicides	
	Source(s)	Notes
	PIER. (2013). <i>Cordia alliodora</i> . Pacific Island Ecosystems at Risk http://www.hear.org/Pier/species/cordia_alliodora.htm . [Accessed 25 Feb 2019]	[Unknown. No information on herbicide efficacy or chemical control of this species. Response to herbicides may be similar to that of related taxa] "Control: Difficult, as plants sprout readily. Grubbing or treatment with herbicides is probably necessary."
	Ung, S. H., Yunus, A., & Chin, W. H. (1979). Biological control of <i>Cordia curassavica</i> (Jacq) R. and S. in Malaysia by <i>Schematiza cordiae</i> Barb. (Coleop.: Galerucidae). Malaysian Agricultural Journal, 52(2), 154-165	Unknown. Related taxon, <i>Cordia curassavica</i> , regenerates after application of some herbicides, demonstrating possible tolerance.

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	Learn 2 Grow. (2019). <i>Cordia lutea</i> . www.learn2grow.com/plants/cordia-lutea/	"Light winter frosts will kill this tree to the ground, but stems will sprout back like a perennial if the roots are not frozen." [Suggests tree will tolerate cutting or be able to resprout after mechanical control]
	Aguilar, N.O., 2001. <i>Cordia dichotoma</i> J.G. Forster [Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyaphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 18 Feb 2019]	[Unknown. Other <i>Cordia</i> species are able to coppice] "It coppices and pollards well."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	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	[Unknown] "The yellow-flowered Geiger tree is not well known from the Hawaiian Islands but reportedly grows in the living collections at the Koko Crater Botanical Garden on O'ahu and the national Tropical Botanical Garden on Kaua'i (C. Imada, pers. comm.). on the Big Island, this shrub was found naturalizing in a new subdivision on a hill in lava rock substrate. This species has only been observed once in our surveys and was found heavily fruiting and naturalizing downslope from a planting."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Naturalized on Hawaii island (Hawaiian Islands)
- Other *Cordia* species are invasive
- May have low palatability to browsing animals (persists in areas with feral ungulates)
- Alternate host of the Lobate Lac Scale (*Paratachardina pseudolobata*) in Hawaii, along with several other tree species
- Tolerates many soil types (Not substrate limited)
- Reproduces by seeds
- Limited self-compatibility (autogamous with low seed set)
- Seeds dispersed by birds, other frugivorous animals and intentionally by people
- Sticky fruit pulp could potentially result in external dispersal
- Gaps in biology and ecology may reduce accuracy of risk prediction

Low Risk Traits

- No evidence of negative impacts outside native range to date
- Unarmed (no spines, thorns, or burrs)
- Grows in full sun (shade may limit spread)
- Not reported to spread vegetatively

Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> Unknown. Not shade tolerant, but may form thickets in native range (inconclusive evidence)

(B) Bird or clearly wind-dispersed?> Dispersed by birds

(C) Life cycle <4 years? Unknown

Outcome = Evaluate