Taxon: Cordia collococca L. **Family:** Boraginaceae

Common Name(s): clammy cherry
manjack
red manjack

Synonym(s): Cordia glabra auct.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 24 Sep 2016

WRA Score: **-1.0** **Designation:** L **Rating:** Low Risk

Keywords: Tropical Tree, Unarmed, Edible Fruit, Dioecious, 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	?
301	Naturalized beyond native range		
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed		
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		
409	Is a shade tolerant plant at some stage of its life cycle		

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
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	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	>3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
702	Propagules dispersed intentionally by people		
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)		
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m2)		
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**
	Linsky, J. 2014. Cordia collococca. The IUCN Red List of Threatened Species 2014: e.T56496522A56503940. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T56496522A5650 940.en. [Accessed 23 Sep 2016]	[No evidence of domestication] "Cordia collococca is a widespread Neotropical tree that is native to countries between Mexico and Venezuela. This species occurs in some protected areas and its seeds are under ex situ conservation at Kew's Millennium Seed Bank. It is not known to be subject to decline in population size and number of individuals. However, its suitable habitat is known to be threatened by urban development and tourism activities. This species is assessed as Least Concern. "

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. 2016. Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. 2016. 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, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 23 Sep 2016]	"Native: Northern America : Mexico Southern America Caribbean: Antigua and Barbuda - Antigua; Barbados; Cuba; Dominica; Dominican Republic; Grenada; Guadeloupe; Haiti; Jamaica; Martinique; Montserrat; Puerto Rico; St. Lucia; St. Vincent and Grenadines; Trinidad and Tobago; Virgin Islands (British); Virgin Islands (U.S.) Mesoamerica: Belize; Costa Rica; El Salvador; Guatemala; Honduras; Nicaragua; Panama Northern South America: Guyana; Venezuela Western South America: Bolivia - Beni; Colombia; Ecuador; Peru - Loreto"

Qsn #	Question	Answer
202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 23 Sep 2016]	

203	Broad climate suitability (environmental versatility)	n
	Source(s)	**Notes**
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	"Cordia collococca occurs in dry forests from sea level to 200(-900) m in elevation from Mexico south to northern South America and the West Indies."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 23 Sep 2016]	"Native: Northern America : Mexico Southern America Caribbean: Antigua and Barbuda - Antigua; Barbados; Cuba; Dominica; Dominican Republic; Grenada; Guadeloupe; Haiti; Jamaica; Martinique; Montserrat; Puerto Rico; St. Lucia; St. Vincent and Grenadines; Trinidad and Tobago; Virgin Islands (British); Virgin Islands (U.S.) Mesoamerica: Belize; Costa Rica; El Salvador; Guatemala; Honduras; Nicaragua; Panama Northern South America: Guyana; Venezuela Western South America: Bolivia - Beni; Colombia; Ecuador; Peru - Loreto"

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	**Notes**
	Useful Tropical Plants Database. (2016). Cordia collococca. http://tropical.theferns.info/viewtropical.php?id=Cordia+collococca. [Accessed 23 Sep 2016]	"The tree is harvested from the wild as a local source of food, medicines and wood. It has been cultivated in Cuba for its fruit and medicinal uses." [Broad native distribution, but limited evidence of cultivation outside native range]

Qsn #	Question	Answer
301	**Naturalized beyond native range**	
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	Cited as a weed, but unable to confirm if this represents a naturalization event, or a designation as a weed within its native range
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. 2016. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/. [Accessed 23 Sep 2016]	No evidence to date

302	**Garden/amenity/disturbance weed**	**n**
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

303	**Agricultural/forestry/horticultural weed**	
	Source(s)	**Notes**
	Reed, C. F. (1977). Economically Important Foreign Weeds. Agricultural Research Service, United States Department of Agriculture, Washington, D.C.	Cordia collococca is listed as an economically important weed, but its impacts are not described

304	**Environmental weed**	**n**
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

305	**Congeneric weed**	**y**
	Source(s)	**Notes**
	Edward, E., Munishi, P., & Hulme, P. (2009). Relative Roles of Disturbance and Propagule Pressure on the Invasion of Humid Tropical Forest by Cordia alliodora (Boraginaceae) in Tanzania. Biotropica, 41(2), 171-178	"C. alliodora poses a significant threat to the East Usambaras as well as other humid forests where it is promoted for agroforestry."

Qsn #	Question	Answer
	CABI, 2016. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	[Cordia alliodora & Cordia oblique] "C. obliqua 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. C. obliqua 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 C. alliodora 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 C. alliodora (Tolfts, 1997; Tschinkel, 1965). A mass of C. alliodora 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, C. alliodora 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 C. alliodora'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. Conservation biology, 12(1), 18-26	[Cordia alliodora] "In the Galapagos archipelago, for example, four alien trees are highly invasive in natural systems. Two of these (Cedrela odorata and Cordia alliodora) were introduced for timber, one for its fruits (Psidium guajava), and one for quinine (Cinchona succirubra)."

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	[No evidence] "Small tree to 8(- 15) m tall, the twigs sparsely to evenly strigillose, later waxy. Leaves deciduous; petioles 5-12(- 15) mm long, sparsely strigillose; blade oblong-obovate to elliptic or obovate, (4.7- 5.5-14(-15.2) cm long, (2.5-)3-6.5(-7) cm wide, the apex acute, often with short-acuminate tip, rarely acute, the base cuneate to acute, the margin entire, the adaxial surface glabrous or nearly so but with numerous small papillae, the abax- ial surface evenly strigillose to hirtellous."

402	Allelopathic	

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. International Journal of Basic and Applied Sciences, 4(4), 381-394	[Unknown. Related taxon exhibits a strong inhibitory effect on lettuce seedlings] "Eight other species (Cordia dichotoma, Asarum nipponicum, Bischofia polycarpa, Mahonia lomariifolia, Taxus wallichiana, Magnolia liliiflora, Hemerocallis fulva, and Acronychia pedunculata) 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 Boraginaceous family, Cordia dichotoma had the highest inhibition on lettuce radicle elongation."

403	Parasitic	n
	Source(s)	**Notes**
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	"Small tree to 8(- 15) m tall, the twigs sparsely to evenly strigillose, later waxy." [Boraginaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	**Notes**
	Iglesias, J. M., Hernández, I., Roche, R., Menéndez, J., & Shateloin, T. (1996). Uso de la flora de la Cienaga de Zapata en la alimentación de los animales domésticos. Pastos y Forrajes, 19(2). 1-4	[Foliage consumed by animals] "Entre las arbóreas, la guásima (Guazuma ulmifolia) fue la más preferida mediante el ramoneo de las plantas jóvenes y el consumo de sus frutos, aunque también se detectó cierta inclinación por el follaje del ateje (Cordia collococca)."
	Zschokke, T. C. (1930). A Manual for Tree Planters in the Hawaiian Islands. Extension Bulletin No. 5. Agricultural Extension Service University of Hawaii, Honolulu	[Palatable fruit] "Shade for poultry and hog pens, as the tree is low and spreading. The fruits are eaten greedily by pheasants, turkeys, and pigs."
	Rusch, G. M., Pezo, Danilo, Støen, M. A., Skarpe, C. & Ibrahim, M. (2010). Silvopastures in Central America: PACA– Final report. – NINA Report 570. Norwegian Institute for Nature Research, Trondheim	Cordia collococca - Usos = M,Fo - timber and forage

405	Toxic to animals	n
	Source(s)	**Notes**
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"West Indies. Tree, fruit fed to hogs" [No evidence]
	Rusch, G. M., Pezo, Danilo, Støen, M. A., Skarpe, C. & Ibrahim, M. (2010). Silvopastures in Central America: PACA– Final report. – NINA Report 570. Norwegian Institute for Nature Research, Trondheim	[Cordia collococca - Usos = M,Fo - timber and forage] "Most common 12 tree and shrub species (dbh > 10 cm) and their habitat affinity (riparian forest (Br), secondary forest (Bs), disturbed areas (Ap) and crops (C)). Seed dispersal vectors (wildlife (As), wind (V) and cattle (G)), Potential uses (forage (Fo), timber (M), firewood (L), shade (S), live fences (Cv) and fruits (Fr)), and 'Importance Index (IVI) in 46 paddocks in Muy Muy, Nicaragua. Source: Esquivel et al. 2009."

406	Host for recognized pests and pathogens	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed]	[Unknown. Related taxon a host of pests & pathogens] "A large number of insect pests are reported, defoliators being among the most important. Larvae of some insects of the families Chrysomelidae, Glyphiplerygidae, Noctuidae, Lymantreedae, Notodontidae, Pyralidae, Sphingidae and Yponomeutidae defoliate the leaves. Larvae of Gracilariidae and Lyonetiidae mine the leaves and those of Eucosmidae roll the leaves. Larvae of some insects belonging to families Eucosmidae, Curculionidae and Pyralidae bore into the fruits and shoots. Austrothrips cochinchinensis forms galls and feeds on the sap. Aceria gallae and A. pobuzii infest C. dichotoma in Taiwan and cause galls on leaves, fruits, shoots and tender stems. The weevil Barioscapus cordiae, adults attack the fruits and feed on the green pedicel, sepals and pollen grains inside the buds."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"West Indies. Tree, fruit fed to hogs" [No evidence]
	Hedrick, U. P. (1919). Sturtevants Edible Plants of the World. Dover Publications,	[No evidence] "The fruit is red, with a sweetish pulp and is edible."

408	Creates a fire hazard in natural ecosystems	
	Source(s)	**Notes**
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	[Unknown. No evidence, but may contribute to fuel load in dry forests that may be prone to fire] "Cordia collococca occurs in dry forests from sea level to 200(-900) m in elevation from Mexico south to northern South America and the West Indies."

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	**Notes**
	Useful Tropical Plants Database. (2016). Cordia collococca. http://tropical.theferns.info/viewtropical.php?id=Cordia+collococca. [Accessed 24 Sep 2016]	"Prefers a sunny position ... Thrives in exposed positions"
	Linsky, J. 2014. Cordia collococca. The IUCN Red List of Threatened Species 2014: e.T56496522A56503940. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T56496522A5650 940.en. [Accessed 24 Sep 2016]	[Occurs in high light environments] "This species is a tree of 5-15 m in height with spreading branches. It grows in coastal forests, thickets, along roadsides and pasture margins (Liogier 1995, Adams 1972). Recent herbarium collections suggest it grows in disturbed areas."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	[Broad distribution, but substrate unspecified] "Cordia collococca occurs in dry forests from sea level to 200(-900) m in elevation from Mexico south to northern South America and the West Indies"

411	Climbing or smothering growth habit	n
	Source(s)	**Notes**
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	"Small tree to 8(- 15) m tall, the twigs sparsely to evenly strigillose, later waxy."

412	Forms dense thickets	n
	Source(s)	**Notes**
	Linsky, J. 2014. Cordia collococca. The IUCN Red List of Threatened Species 2014: e.T56496522A56503940. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T56496522A5650 940.en. [Accessed 24 Sep 2016]	[No evidence] "Cordia collococca is a widespread Neotropical tree that is native to countries between Mexico and Venezuela. This species occurs in some protected areas and its seeds are under ex situ conservation at Kew's Millennium Seed Bank. It is not known to be subject to decline in population size and number of individuals. However, its suitable habitat is known to be threatened by urban development and tourism activities. This species is assessed as Least Concern. "
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	[No evidence] "Cordia collococca occurs in dry forests from sea level to 200(-900) m in elevation from Mexico south to northern South America and the West Indies."

501	Aquatic	n
	Source(s)	**Notes**
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	[Terrestrial] "Small tree to 8(- 15) m tall ..." ... "Cordia collococca occurs in dry forests from sea level to 200(-900) m in elevation from Mexico south to northern South America and the West Indies."

502	Grass	n
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 23 Sep 2016]	Family: Boraginaceae Subfamily: Cordioideae

Qsn #	Question	Answer
503	**Nitrogen fixing woody plant**	**n**
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 23 Sep 2016]	Family: Boraginaceae Subfamily: Cordioideae

504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**n**
	Source(s)	**Notes**
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	"Small tree to 8(- 15) m tall, the twigs sparsely to evenly strigillose, later waxy."

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	"Cordia collococca is a relatively common species throughout much of its range, al- though it has not been collected frequently in Panama."
	Linsky, J. 2014. Cordia collococca. The IUCN Red List of Threatened Species 2014: e.T56496522A56503940. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T56496522A5650 940.en. [Accessed 23 Sep 2016]	"Cordia collococca is a widespread Neotropical tree that is native to countries between Mexico and Venezuela. This species occurs in some protected areas and its seeds are under ex situ conservation at Kew's Millennium Seed Bank. It is not known to be subject to decline in population size and number of individuals. However, its suitable habitat is known to be threatened by urban development and tourism activities. This species is assessed as Least Concern. "

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Linsky, J. 2014. Cordia collococca. The IUCN Red List of Threatened Species 2014: e.T56496522A56503940. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T56496522A5650 940.en. [Accessed 24 Sep 2016]	"Cordia collococca is a widespread Neotropical tree that is native to countries between Mexico and Venezuela. This species occurs in some protected areas and its seeds are under ex situ conservation at Kew's Millennium Seed Bank."
	Useful Tropical Plants Database. (2016). Cordia collococca. http://tropical.theferns.info/viewtropical.php?id=Cordia+collococca. [Accessed 24 Sep 2016]	"Propagation: Seed"

603	**Hybridizes naturally**	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Miller, J. S. (1985). Hybridization in Cordia section Varronia (Boraginaceae). Cordia section Varronia. American Journal of Botany, 72(6): 963	[Unknown. Hybridization documented in genus] "Cordia section Varronia is a group of 50-60 species of shrubs which are widespread in the Neotropics. Treatmenvs 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 Cordia curassavica and Cordia bullata produce no viable pollen and appear to be sterile. They may however, persist vegetatively. Hybrids between closely related species such 8s Cordia globose and Cordia bullata 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	n
	Source(s)	**Notes**
	Finkeldey, R. & Hattemer, H.H. (2007). Tropical Forest Genetics. Springer-Verlag, Berlin	"Other species of the genus Cordia (Boraginaceae) are dioecious (C. inermis, C. collococca, and C. panamensis), and Cordia alliodora is self-compatible, but predominantly outcrossing (Boshier et al. 1995; Table 6.2)."
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	"Plants dioecious; leaves deciduous; flowers usually borne below the current season's growth"

605	Requires specialist pollinators	n
	Source(s)	**Notes**
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	"Inflorescence terminal, borne on old wood just before the new vegetative shoots appear, or axillary, cymose, (6-)7-14(-18) cm broad, the branches sparsely strigillose. Flowers sessile, unisexual by abortion, the plants dioecious; female flowers with small, nonfunctional anthers; male flowers with shortened, reduced styles; calyx cupulate, (1.7-)2-2.6 (-3) mm long, ribs absent, evenly strigillose, circumscissile or unevenly 3-lobed; corolla white, tubular with reflexed lobes, (4.5-)4.8- 6.3(-6.9) mm long, 5-merous, the lobes oblong-ovate to ovate, (2.3-)2.8-3. (-4) mm long, the tube 1.7-2.9(-3.3) mm long; stamens 5, the filaments 2.5-5 mm long, the upper (0.8-)1.7-2.2 mm free, puberulent to pubescent below insertion, the anthers oblong to ellipsoid, 0.5-1.6 mm long; ovary ovoid to oblong, 0.8-1.2 mm long, glabrous; style 0.4-2 mm long, the stigma lobes clavate to filiform."
	Bentley, B. & Elias, T. S. (1983). The Biology of Nectaries. Columbia University Press, New York	"Table 2.9. Nectar production and floral features of nectariferous plant adapted principally for mall bee and wasp pollination." [Includes Cordia collococca]

606	Reproduction by vegetative fragmentation	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Useful Tropical Plants Database. (2016). Cordia collococca. http://tropical.theferns.info/viewtropical.php?id=Cordia+collococca. [Accessed 24 Sep 2016]	"Propagation Seed" [No evidence. Other Cordia species can spread from fallen branches]

607	Minimum generative time (years)	>3
	Source(s)	**Notes**
	Opler, P. A., Baker, H. G., & Frankie, G. W. (1975). Reproductive biology of some Costa Rican Cordia species (Boraginaceae). Biotropica, 7(4): 234-247	"Cordia alliodora, C. collococca, and C. panamensis also appear early in successional sequences, yet reproductive activity begins only when these incipient trees attain heights greater than five meters."
	Weaver, P. L., & Schwagerl, J. J. (2008). Secondary forest succession and tree planting at the Laguna Cartagena and Cabo Rojo Wildlife Refuges in southwestern Puerto Rico. Ambio, 37(7), 598-603	"Table 2. Growth rates of planted trees at Laguna Cartagena National Wildlife Refuge in Puerto Rico" [Cordia collococca - Stem growth rates - Height (m y-1) = 0.70 ± 0.02]
	WRA Specialist. 2016. Personal Communication	Based on a growth rate of 0.7 m/year, & a reproductive height of 5 m, Cordia collococca should reach reproductive maturity from seed in about 7 years

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	**Notes**
	Mut, J. A. M. (2008). Trees and palms of the University of Puerto Rico at Mayaguez. http://edicionesdigitales.info/arbolesrumengl/. [Accessed 24 Sep 2016]	[Possible that sticky pulp will allow seeds to adhere to footwear, or vehicles] "Fruits are up to half an inch in diameter and taste like watermelon. Wild birds and bats eat the fruits and disperse the seeds." ... "The species name means sticky fruit, in reference to the mucilaginous or sticky consistency of the pulp."
	Linsky, J. 2014. Cordia collococca. The IUCN Red List of Threatened Species 2014: e.T56496522A56503940. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T56496522A5650 940.en. [Accessed 23 Sep 2016]	[Roadsides, Possible. Sticky pulp may provide means of external attachment] "This species is a tree of 5-15 m in height with spreading branches. It grows in coastal forests, thickets, along roadsides and pasture margins (Liogier 1995, Adams 1972). Recent herbarium collections suggest it grows in disturbed areas."

702	Propagules dispersed intentionally by people	
	Source(s)	**Notes**
	Useful Tropical Plants Database. (2016). Cordia collococca. http://tropical.theferns.info/viewtropical.php?id=Cordia+collococca. [Accessed 24 Sep 2016]	"The tree could serve as a very useful species in reforestation efforts, since it withstands intense insolation, grows quickly, provides shade, and generates food appealing to wildlife" [Cultivated mostly within its native range. Frequency of cultivation outside native range unknown]

Qsn #	Question	Answer
703	**Propagules likely to disperse as a produce contaminant**	**n**
	Source(s)	**Notes**
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	"Small tree to 8(- 15) m tall" ... "Fruit borne with the small calyx persisting at the base, bright red, drupaceous, glabrous, the stone inequilaterally ovoid, 7.5- 9.3 mm long, 5.5-7.3 mm broad, the endocarp bony." [Unlikely. A tree that does not reach maturity for 5+ years, and produces bird & mammal dispersed fruit]

704	Propagules adapted to wind dispersal	n
	Source(s)	**Notes**
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	[Fleshy-fruited] "Fruit borne with the small calyx persisting at the base, bright red, drupaceous, glabrous, the stone inequilaterally ovoid, 7.5- 9.3 mm long, 5.5-7.3 mm broad, the endocarp bony."

705	Propagules water dispersed	n
	Source(s)	**Notes**
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	"Fruit borne with the small calyx persisting at the base, bright red, drupaceous, glabrous, the stone inequilaterally ovoid, 7.5- 9.3 mm long, 5.5-7.3 mm broad, the endocarp bony." ... "Cordia collococca occurs in dry forests from sea level to 200(-900) m in elevation" [Unlikely. Occurs in dry forests & produces animal-dispersed seeds]

706	Propagules bird dispersed	y
	Source(s)	**Notes**
	Merlos, D. S., Harvey, C. A., Grijalva, A., Medina, A., Hernández, B., & Vílchez, S. (2005). Vegetation diversity, composition and structure in a cattle agro-landscape of Matiguás, Nicaragua. Revista de Biología Tropical/International Journal of Tropical Biology and Conservation, 53(3-4), 387-414	"APPENDIX 1 Trees species (dap ≥10 cm) recorded in Matiguás, Nicaragua" [Cordia collococca - Dispersión = Aves]
	Miller, J. (1988). A Revised Treatment of Boraginaceae for Panama. Annals of the Missouri Botanical Garden, 75(2), 456-521	"Fruit borne with the small calyx persisting at the base, bright red, drupaceous, glabrous, the stone inequilaterally ovoid, 7.5- 9.3 mm long, 5.5-7.3 mm broad, the endocarp bony."
	Little Jr, E. L., Woodbury, R. O., & Wadsworth, F. H. (1974). Trees of Puerto Rico and the Virgin Islands. Second Volume. Agriculture Handbook 449, US Department of Agriculture, Washington, D.C.	"In other areas the fruits are eaten by hogs and chickens and the roots are used in home remedies."
	Greenhall, A. (1957). Food Preferences of Trinidad Fruit Bats. Journal of Mammalogy, 38(3), 409-410	"TABLE 1.-Food preferences of Artibeus" [Cordia collococca fruit consumed by fruit bats]

Qsn #	Question	Answer
707	**Propagules dispersed by other animals (externally)**	
	Source(s)	**Notes**
	Mut, J. A. M. (2008). Trees and palms of the University of Puerto Rico at Mayaguez. http://edicionesdigitales.info/arbolesrumengl/. [Accessed 24 Sep 2016]	[Sticky pulp may provide means of external attachment] "Fruits are up to half an inch in diameter and taste like watermelon. Wild birds and bats eat the fruits and disperse the seeds." ... "The species name means sticky fruit, in reference to the mucilaginous or sticky consistency of the pulp."

708	**Propagules survive passage through the gut**	**y**
	Source(s)	**Notes**
	Mut, J. A. M. (2008). Trees and palms of the University of Puerto Rico at Mayaguez. http://edicionesdigitales.info/arbolesrumengl/. [Accessed 24 Sep 2016]	"Fruits are up to half an inch in diameter and taste like watermelon. Wild birds and bats eat the fruits and disperse the seeds."
	Opler, P. A., Baker, H. G., & Frankie, G. W. (1975). Reproductive biology of some Costa Rican Cordia species (Boraginaceae). Biotropica, 7(4): 234-247	"Howler monkeys were observed to eat the fruits of Cordia dentata (K. Glander, pers. comm.), while the seeds of Cordia collococca were found in Coati scat. Thus, the fruits of this group are apparently adapted for dispersal by arboreal mammals."

801	**Prolific seed production (>1000/m2)**	
	Source(s)	**Notes**
	Useful Tropical Plants Database. (2016). Cordia collococca. http://tropical.theferns.info/viewtropical.php?id=Cordia+collococca. [Accessed 24 Sep 2016]	"The tree has a main fruiting season, but can also produce some fruits throughout the year" [Seed densities unknown]

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	"TABLE 9.1 Dormancy class or nondormancy (D/ND) in seeds of nonpioneer trees of evergreen rainforests." [Cordia collococca - ND*, PD* = Non-Dormant & Physiological Dormancy. Persistent in field unknown]

803	**Well controlled by herbicides**	
	Source(s)	**Notes**
	PIER. (2013). Cordia alliodora. Pacific Island Ecosystems at Riskhttp://www.hear.org/Pier/species/cordia_alliodora.htm. [Accessed 23 Sep 2016]	[Unknown. No information on herbicide efficacy or chemical control of this species. Response to herbicides may be similar to that of related taxa] "Cordia alliodora ... Control: Difficult, as plants sprout readily. Grubbing or treatment with herbicides is probably necessary."

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Otterstrom, S. M., Schwartz, M. W., & VelázquezRocha, I. (2006). Responses to Fire in Selected Tropical Dry Forest Trees1. Biotropica, 38(5), 592-598	[Seedling recruitment following fire] "Although some species did experience a decrease in seedling densities post fire, no common species was devastated by fire's impact and many new species were introduced as a result of the fire." ... "Although many of the newly introduced seedlings may be considered early colonizers (e.g., Malvaviscus arboreus Cav.; Senna pallida var. pallida; Cordia collococca L.), at least eight species are overstory trees consistent with a healthy dry forest"

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	WRA Specialist. 2016. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits
• Grows in tropical climates
• Documented as a weed, but unable to corroborate or identify impacts
• Other Cordia species have become invasive
• Reproduces by seeds
• Seeds dispersed by frugivorous birds & mammals
• Seeds able to be stored for extended periods; May form a persistent seed bank
• Able to coppice & resprout after cutting
• Limited ecological information reduces accuracy of risk prediction

Low Risk Traits
• No reports of naturalization, but no evidence of widespread introduction outside native range
• Unarmed (no spines, thorns or burrs)
• Provides fodder for livestock
• Edible fruit
• Dioecious
• Reaches maturity in ca. 7 years
• Not reported to spread vegetatively