

Taxon: <i>Bursera simaruba</i>	Family: Burseraceae
Common Name(s): almácigo gumbo limbo tourist tree turpentine tree	Synonym(s): Elaphrium simaruba (L.) Rose Pistacia simaruba L. (basionym)

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 12 Aug 2021
WRA Score: 7.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Tropical Tree, Unarmed, Fleshy-fruited, Bird-dispersed, Coppices

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	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	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		
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	y
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	y=1, n=-1	y
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)	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)		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
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
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	[No evidence] "From Central America to the Caribbean, <i>B. simaruba</i> is used for firewood or charcoal, and for living fence posts. This fast-growing species has great potential for different industrial uses such as: sawtimber, veneer, plywood for interior use, boxes, crates, soles for sandals, furniture, matchsticks and toothpicks, but it has not been exploited except for ornamental purposes. It produces an aromatic resin, which is dried, concentrated and the chips burned as incense for religious uses (NAS, 1983)."
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	NA
103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2021). 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
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	" <i>B. simaruba</i> is widely distributed from southern Florida in the USA to the northern part of South America, including the majority of the islands in the Greater and Lesser Antilles. It grows on both coasts of central Mexico, from southern Tamaulipas to Quintana Roo and from Sinaloa to Chiapas (Pennington and Sarukhan, 1998; Francis, 1990; Chavelas Polito and Devall, 1988)."
202	Quality of climate match data	High
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	
203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Vozzo, J.A. (2002). Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	"Although the species grows at elevations from 0 m to 1800 m, it is most common at approximately 1000 m (Lagos 1977, Méndez and others 1994, Witsberger and others 1982)."

Qsn #	Question	Answer
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	[Environmentally versatile. Elevation range exceeds 1000 m] "B. simaruba requires a subtropical or tropical climate, although large trees tolerate brief winter frosts. It tolerates drought and wind (Chavelas Polito and Devall, 1988). In North and Central America on the Atlantic Coast, it grows in a tropical subhumid climate with rainfall in the summer, with small variations in temperature during the hottest month before the summer solstice, and with little winter rainfall. The rainy season occurs from May to October, although the entire area is affected by hurricanes which occur most frequently in September. During November and December, the area is affected by boreal air masses from northeastern Canada and the USA which cause a violent drop in temperature and, frequently, persistent light rain and fog (Ruiz Zavala, 1988). B. simaruba survives rare frosts in Florida, and possibly Mexico (Francis, 1990). Climatic amplitude (estimates) - Altitude range: 0 - 1800 m - Mean annual rainfall: 500 - 1400 mm - Rainfall regime: summer; winter - Dry season duration: 1 - 6 months - Mean annual temperature: 18 - 28°C - Mean maximum temperature of hottest month: 28 - 36°C - Mean minimum temperature of coldest month: 13 - 26°C"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"B. simaruba is widely distributed from southern Florida in the USA to the northern part of South America, including the majority of the islands in the Greater and Lesser Antilles. It grows on both coasts of central Mexico, from southern Tamaulipas to Quintana Roo and from Sinaloa to Chiapas (Pennington and Sarukhan, 1998; Francis, 1990; Chavelas Polito and Devall, 1988)."
	Parsons, R. & Parker, J. (2015). BIISC Early Detection Botanist. Pers. Comm. 21 October	[Naturalized in Kona, HI] "While surveying in Kona, we found <i>Bursera simaruba</i> (gumbo limbo) popping up on a property adjacent to Alii Drive. The property was an undeveloped lot with various grasses growing on it including fountain grass and guinea grass along with at least 10 gumbo limbo trees."

205	Does the species have a history of repeated introductions outside its natural range?	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"There are no reports concerning the introduction of <i>B. simaruba</i> as an exotic plantation species in countries outside its natural distribution, but it is planted for amenity and landscaping purposes in Mexico and Florida, USA (Chavelas Polito and Devall, 1988). Experimental plantations have been established in Costa Rica (Gonzalez, 1980)."

301	Naturalized beyond native range	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Kairo, M., Ali, B., Cheesman, O., Haysom, K., & Murphy, S. (2003). Invasive species threats in the Caribbean Region. Report to the Nature Conservancy, CAB International, Caribbean and Latin American Regional Centre, Trinidad & Tobago West Indies	"10.8 Appendix 8 A list of species reported exotic, naturalized or naturalized and invasive in the Caribbean." [Bursera simaruba - Naturalised In Bermuda. In contrast to Francis (1990)]
	Francis, J.K. (1990). <i>Bursera simaruba</i> (L.) Sarg. Burseraceae Bursera family. SO-ITF-SM-M. Institute of Tropical Forestry, USDA Forest Service, Southern Forest Experiment Station, Rio Piedras. Puerto Rico	"The natural range of almacigo extends from southern Florida and the Bahamas through the Greater and Lesser Antilles and into northern South America (17,18), (fig. 2). It also grows on both coasts of central Mexico, through Central America, and along the Pacific Coast of South America nearly to the Equator (/6. 27). The range stretches from about 10 to 27 ON. latitude. There are no reports of naturalization of almacigo beyond its native range." [Contradicts Kairo and Ali 2003]
	Parsons, R. & Parker, J. (2015). BIISC Early Detection Botanist. Pers. Comm. 21 October	[Naturalized in Kona, HI] "While surveying in Kona, we found <i>Bursera simaruba</i> (gumbo limbo) popping up on a property adjacent to Alii Drive. The property was an undeveloped lot with various grasses growing on it including fountain grass and guinea grass along with at least 10 gumbo limbo trees."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Gilman, E.F. & Watson, D.G. (1993). <i>Bursera simaruba</i> - Gumbo Limbo. Fact Sheet ST-104. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. http://hort.ifas.ufl.edu/ . [Accessed 9 Aug 2021]	"Roots: surface roots can lift sidewalks or interfere with mowing" [May cause problems in landscape settings]
	National Research Council (U.S.). Advisory Committee on Technology Innovation. (1983). Firewood crops: shrub and tree species for energy production : volume 2. National Academy Press, Washington, D.C.	"The gumbo limbo is much used as an ornamental. In southern Florida it is planted as a landscape tree in new developments and along streets" ... "Limitations: Apart from cold sensitivity, the handicaps seem to be only the brittleness of branches, which may be snapped off by strong gusts of wind" [Used as a street tree despite brittle limbs]
	Riffle, R.L. (1998). The Tropical Look - An Encyclopedia of Dramatic Landscape Plants. Timber Press, Portland, OR	"The limbs, which are usually few but heavy and massive, are rather weak and will break in strong winds." [May become a nuisance or liability along roadside, or near structures of power lines]

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

Qsn #	Question	Answer
	van der Burg, W. J., De Freitas, J., Debrot, A. O., & Lotz, L. A. P. (2012). Naturalised and invasive alien plant species in the Caribbean Netherlands: status, distribution, threats, priorities and recommendations. PRI report 437. Institute for Marine Resources and Ecosystem Studies (IMARES) report C185/11, Wageningen, The Netherlands	"The species marked with an asterisk (*) are, if imported from elsewhere (e.g. from Florida), a threat to biodiversity mainly through genetic contamination via cross breeding." [<i>Bursera simaruba</i> (L.) Sarg.*]
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Regarded as potentially problematic in the Caribbean Netherlands due to possibility of crossing and contaminating native populations of <i>Bursera</i> . See van der Burg et al. (2012).

305	Congeneric weed	
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	" <i>Bursera inaguensis</i> Britt. Burseraceae Total N° of Refs: 1 Preferred Climate/s: Tropical References: Cuba-A-14." [Designated A = Agricultural Weed Species commonly found in or impacts on any harvested commodity be they broadacre crops, plantations, orchards, small vegetable plots etc.. No other evidence found to verify this designation]

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	" <i>B. simaruba</i> is medium sized, deciduous tree with an irregular, open crown that reaches 18 to 30 m in height with a d.b.h. of 60-80 cm. It has a somewhat thick trunk with smooth, reddish brown or copper-coloured bark which peels off in thin flakes to expose a greenish-brown layer underneath; the bark ranges from 16 to 40 mm thick." ... "The leaves are compound and arranged in a spiral that is 15-30 cm long with 7-13 leaflets, each being 4.5-9 cm long and 2-4 cm wide. Leaflets vary from bright to dark green, are ovate-lanceolate and oblong with an acuminate apex and an asymmetric base (Chavelas Polito and Devall, 1988). The tree is bare during the cool and dry season. The leaves exhibit a turpentine odour when crushed (NAS, 1983; Chavelas Polito and Devall, 1988)."

402	Allelopathic	
	Source(s)	Notes

Qsn #	Question	Answer
	Macías-Rubalcava, M. L., Hernández-Bautista, B. E., Oropeza, F., Duarte, G., González, M. C., Glenn, A. E., Hanlin, R. H. & Anaya, A. L. (2010). Allelochemical effects of volatile compounds and organic extracts from <i>Muscodor yucatanensis</i> , a tropical endophytic fungus from <i>Bursera simaruba</i> . <i>Journal of Chemical Ecology</i> , 36 (10): 1122-1131	[Associated fungus may have allelopathic properties] " <i>Muscodor yucatanensis</i> , an endophytic fungus, was isolated from the leaves of <i>Bursera simaruba</i> (Burseraceae) in a dry, semideciduous tropical forest in the Ecological Reserve El Eden, Quintana Roo, Mexico. We tested the mixture of volatile organic compounds (VOCs) produced by <i>M. yucatanensis</i> for allelochemical effects against other endophytic fungi, phytopathogenic fungi and fungoids, and plants. VOCs were lethal to <i>Guignardia mangifera</i> , <i>Colletotrichum</i> sp., <i>Phomopsis</i> sp., <i>Alternaria solani</i> , <i>Rhizoctonia</i> sp., <i>Phytophthora capsici</i> , and <i>P. parasitica</i> , but had no effect on <i>Fusarium oxysporum</i> , <i>Xylaria</i> sp., the endophytic isolate 120, or <i>M. yucatanensis</i> ." ... "In general, extracts inhibited plants more than endophytic or phytopathogens fungi. <i>G. mangifera</i> was the only organism that was significantly stimulated by both extracts regardless of concentration. Compounds in both organic extracts were identified by gas chromatography/mass spectrometry. We discuss the possible allelopathic role that metabolites of <i>M. yucatanensis</i> play in its ecological interactions with its host plant and other organisms."

403	Parasitic	n
	Source(s)	Notes
	CAB International. (2005). <i>Forestry Compendium</i> . CAB International, Wallingford, UK	" <i>B. simaruba</i> is medium sized, deciduous tree with an irregular, open crown that reaches 18 to 30 m in height with a d.b.h. of 60-80 cm." [No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	CAB International. (2005). <i>Forestry Compendium</i> . CAB International, Wallingford, UK	"In Costa Rica, white-faced monkeys eat young branch tips in May when the leaves are starting to grow, which can cause extensive damage, although the tree contains volatile terpenes which could help to protect it against subsequent defoliation (Chavelas Polito and Devall, 1988)." ... " <i>B. simaruba</i> branches are cut to provide fodder for cattle."
	Ascencio-Rojas, L., Valles-de la Mora, B., Ibrahim, M., & Castillo Gallegos, E. (2013). Use and management of tree fodder resources on farms in central Veracruz, Mexico. <i>Avances en Investigacion Agropecuaria</i> , 17(1): 95-117	"Table 10. Species used as fodder for animal feed, in three animal production systems." [Includes <i>Bursera simaruba</i>]

405	Toxic to animals	n
	Source(s)	Notes
	Vozzo, J.A. (2002). <i>Tropical Tree Seed Manual</i> . USDA Forest Service, Washington, D.C.	"The fruits and foliage can be used as forage for livestock (Alfaro and Rojas 1992)." [No evidence of toxicity]
	Wagstaff, D.J. (2008). <i>International poisonous plants checklist: an evidence-based reference</i> . CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	

Qsn #	Question	Answer
	Source(s)	Notes
	Brown, S.H. (2012). <i>Bursera simaruba</i> Factsheet. IFAS, University of Florida, Fort Myers, FL	"Croton Scale: The gumbo limbo has a long history of not being susceptible to any major pests. However, in 2008, the croton scale (<i>Phalacrocooccus howertoni</i>) was discovered on Marathon Key in Monroe County. It has since become a major pest of gumbo limbo. It feeds by sucking the sap from plants and causing them to weakened if not controlled. Symptoms of croton scale infestation include plant decline and defoliation as well as heavy sooty mold accumulation. Sooty mold is produced when the sugary secretion of the scales is used as food by the fungus. The croton scale may be seen in mass along twigs, stems and leaf petioles of affected trees. Croton scale affects over 50 plants ranging from native and exotic plants, fruit trees, ornamental plants, and weeds." ... "Another major pest of the gumbo is the rugose spiraling whitefly (<i>Aleurodicus rugioperculatus</i>). It was first discovered in Miami-Dade County in 2009."
	CABI. (2021). <i>Bursera simaruba</i> (turpentine tree). In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Minor host of: <i>Aleurodicus rugioperculatus</i> (rugose spiralling whitefly) Wild host of: <i>Cupaniopsis anacardioides</i> (carrotwood) Host of (source - data mining): <i>Diaprepes abbreviatus</i> (citrus weevil)"
	Gilman, E.F. & Watson, D.G. (1993). <i>Bursera simaruba</i> - Gumbo Limbo. Fact Sheet ST-104. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. http://hort.ifas.ufl.edu/ . [Accessed 9 Aug 2021]	"No pests or diseases are of major concern. Occasionally caterpillars will chew the leaves, but rarely damage enough to warrant control."
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"The aromatic resin of <i>B. simaruba</i> is a natural insect repellent, and no pests or diseases are reported for this species (NAS, 1983). In Costa Rica, the smooth bark is used as a nest site for wasps (<i>Synoecca</i> spp.), but it is not known whether the tree benefits from this association (Chavelas Polito and Devall, 1988)."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Brown, S.H. (2012). <i>Bursera simaruba</i> Factsheet. IFAS, University of Florida, Fort Myers, FL	"Human Hazards: None"
	Vozzo, J.A. (2002). Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	"The fruits, seeds, leaves, and bark have popular medicinal value in treating wounds, gout, digestive ailments, toothache, fever, kidney stones, and lung infections (Elias 1980, Gonzalez Ayala 1994, Timyan 1996). The bark is also used as antidote for snakebites, and leaf cataplasms are used to stop gangrene infections. The resinous sap can be used to make wood varnishes or glue that may substitute for gum Arabic (Aguilar and Aguilar 1992, Méndez and others 1994). In Guatemala, after the resin is collected from the trunks, it is hardened in blocks and used as incense in churches."

Qsn #	Question	Answer
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Numerous medicinal uses. No evidence of toxicity, but may be dosage dependent. Caution advised] "Antiinflammatory, purgative, antimicrobial, for fever and colds, back pain, rheumatism, diarrhea, dermatitis. <i>Bursera simaruba</i> is known as the antidote to skin burns produced by the chechen, <i>Metopium brownei</i> . Flowers and fruits remedies for snakebite and diarrhea; branches and leaves for cold, fever and diarrhea. Bark used for cleaning wounds, spider bites, fever, nose bleeding, and muscle pain and an infusion of the wood decoction is said to help lose weight. Hot sap mixed with sugar as a blood tonic taken by pregnant women; resin plastered onto strain areas of the body. Leaves used for ulcers, measles, infected gums, asthma, bloody stools and pain, headache, stomachache and toothaches; leaves infusion for rash. Love potion. the leafy twig."
	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	
	Source(s)	Notes
	Francis, J.K. (1990). <i>Bursera simaruba</i> (L.) Sarg. Burseraceae Bursers family. SO-ITF-SM-M. Institute of Tropical Forestry, USDA Forest Service, Southern Forest Experiment Station, Rio Piedras. Puerto Rico	"Almácigo is susceptible to fire injury owing to the combustible resin in its bark and wood (11)." [Combustible resin could increase fire risk in fire prone areas]
	National Research Council (U.S.). Advisory Committee on Technology Innovation. (1983). Firewood crops: shrub and tree species for energy production : volume 2. National Academy Press, Washington, D.C.	"The wood has a high moisture content, but when thoroughly dry it is commonly burned as firewood and charcoal. Because of its flammability, Indians of Yucatan use it for kindling. The"
	Trejo, D. A. R. (2008). Fire regimes, fire ecology, and fire management in Mexico. <i>AMBIO: a Journal of the Human Environment</i> , 37(7): 548-556	[In fire-perturbed forests] "For the fire-perturbed areas, the same authors also found that species typical of secondary, savanna-like or savanna vegetation dominated the forest (<i>Bursera simaruba</i> , <i>Byrsonima crassifolia</i> , <i>Cecropia obtusifolia</i> , <i>Cedrela odorata</i> , <i>Cordia alliodora</i> , <i>Heliocarpus donnell-smithii</i> , <i>Lysiloma acapulcensis</i> , <i>Piscidia piscipula</i> , <i>Tabebuia rosea</i> , and <i>Zuelania guidonia</i>)."
	Anderson, R.C., Fralish, J.S. & Baskin, J.M. (eds.). 1999. Savannas, Barrens, and Rock Outcrop Plant Communities of North America. Cambridge University Press, Cambridge, UK	[May survive fires] "A few subtropical hardwoods are resistant to fires (e.g., <i>Bursera simaruba</i> , which has layered bark, and palms, such as <i>Sabal palmetto</i> and <i>Serenoa repens</i>)."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	National Research Council (U.S.). Advisory Committee on Technology Innovation. (1983). Firewood crops: shrub and tree species for energy production : volume 2. National Academy Press, Washington, D.C.	"Ability to compete with weeds. Being a forest tree, the gumbo limbo tolerates shade at all stages of growth. It is not retarded by the shade of competing vegetation even in the juvenile period."

Qsn #	Question	Answer
	Francis, J.K. (1990). <i>Bursera simaruba</i> (L.) Sarg. Burseraceae Bursers family. SO-ITF-SM-M. Institute of Tropical Forestry, USDA Forest Service, Southern Forest Experiment Station, Rio Piedras. Puerto Rico	"Almácigo is intolerant of shade. Reproduction usually does not occur under closed stands of almácigo or other species that cast moderate to dense shade (author, personal observation). However, at least one reference says that the species is tolerant of shade at all growth stages (24). Almácigo tolerates "open shade" as along streets and beaches (31)." [In contrast to CABI 2005]
	CAB International. (2005). <i>Forestry Compendium</i> . CAB International, Wallingford, UK	" <i>B. simaruba</i> has beneficial silvicultural characteristics such as rapid regeneration, tolerance to shade at all stages of growth, tolerance to salt, wind, and wet and dry growing conditions, ability to compete with weeds, and the capacity to sprout and propagate vegetatively (NAS, 1983; Chavelas Polito and Devall, 1988)."
	Ewel, J. J. (1976). Litter fall and leaf decomposition in a tropical forest succession in eastern Guatemala. <i>The Journal of Ecology</i> , 64(1): 293-308	"The presence of some shade-intolerant species, such as <i>Bursera simaruba</i> (L.) Sarg. and <i>Pithecollobium saman</i> (Jacq.) Benth., suggests that these forests maybe of secondary origin, but their exact age is unknown."
	Dickinson, M. B., Whigham, D. F., & Hermann, S. M. (2000). Tree regeneration in felling and natural treefall disturbances in a semideciduous tropical forest in Mexico. <i>Forest Ecology and Management</i> , 134(1): 137-151	[Classified as shade-intolerant in this study] "Frequencies of shade-intolerant species were higher in felling than in natural gaps (F(1,16) 19.4, P 0.0004, Fig. 7). The two species with the highest relative frequencies in felling gaps were species that root sprouted (<i>Guettarda combsii</i> and <i>Bursera simaruba</i>)." ... "Though the most important timber species in southeastern Mexico are and have been shade intolerant (e.g., mahogany, <i>Dendropanax arboreus</i> , <i>Bursera simaruba</i> , <i>Metopium brownei</i> , and <i>Lysiloma bahamensis</i>), future logging is likely to increasingly target relatively abundant shade-tolerant species as more species are incorporated into the regional saw-timber market"
	McLaren, K. P., & McDonald, M. A. (2003). Seedling dynamics after different intensities of human disturbance in a tropical dry limestone forest in Jamaica. <i>Journal of Tropical Ecology</i> , 19(05): 567-578	[Facultative shade tolerance] "Recruitment overall was not significantly affected by the treatments but during the period of highest recruitment (July–Dec 1999), it recruited significantly more seedlings in partially cut plots than clear-cut plots. Its distribution was strongly related to light levels, with light accounting for a high per cent of the variation in the density of individuals. Ray (1993) and Ray & Brown (1995) determined that for <i>B. simaruba</i> , survival characteristics were; good survival without shade but survival was enhanced by medium shading. Khurana & Singh (2000) reviewing the ecology of seeds and seedlings in tropical dry forests described the shade demand of <i>B. simaruba</i> as facultative, rather than absolute. Overall <i>B. simaruba</i> showed good survival characteristics irrespective of treatments. This in part explains the occurrence of emergents of <i>B. simaruba</i> in disturbed dry forest throughout Central America (pers. obs.);"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Francis, J.K. (1990). <i>Bursera simaruba</i> (L.) Sarg. Burseraceae Bursers family. SO-ITF-SM-M. Institute of Tropical Forestry, USDA Forest Service, Southern Forest Experiment Station, Rio Piedras. Puerto Rico	"...grows on a wide variety of sites. Generally, it is moat common on dry, rocky limestone hills and calcareous soils; however, it grows to greater sizes in alluvial valleys (/7,20,24). Soils with textures ranging from sand to clay and pH's ranging from 5.5 to 8.5 are colonized."

Qsn #	Question	Answer
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"B. simaruba can grow in extreme soil types varying from fertile to barren limestone, although it grows best in rich lowlands. It has a high degree of salt, drought and wind tolerance (NAS, 1983). Due to its wide ecological distribution, it can be found in diverse types of soil belonging to lithosol, vertisol and oxisol soil types. However, it also has been observed growing in Mexico's Yucatan peninsula on limestone soils. It can be found on level sites and steep slopes (Chavelas Polito and Devall, 1988)."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"B. simaruba is medium sized, deciduous tree with an irregular, open crown that reaches 18 to 30 m in height with a d.b.h. of 60-80 cm."

412	Forms dense thickets	y
	Source(s)	Notes
	Longwood, F. R. (1962). Present and potential commercial timbers of the Caribbean. Agriculture Handbook No. 207. USDA Forest Service, Washington, D.C.	"It occurs in some sites as pure or nearly pure forests, and in others as an occasional to very frequent tree."
	Francis, J.K. (1990). <i>Bursera simaruba</i> (L.) Sarg. Burseraceae Bursers family. SO-ITF-SM-M. Institute of Tropical Forestry, USDA Forest Service, Southern Forest Experiment Station, Rio Piedras. Puerto Rico	Although almácigo generally grows as a component of mixed stands, it is also found in pure or nearly pure stands (20)."

501	Aquatic	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"B. simaruba can grow in extreme soil types varying from fertile to barren limestone, although it grows best in rich lowlands." [Terrestrial]

502	Grass	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	Burseraceae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	Burseraceae

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"B. simaruba is medium sized, deciduous tree with an irregular, open crown that reaches 18 to 30 m in height with a d.b.h. of 60-80 cm."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	National Research Council (U.S.). Advisory Committee on Technology Innovation. (1983). Firewood crops: shrub and tree species for energy production : volume 2. National Academy Press, Washington, D.C.	"Distribution This handsome tree is native to and esteemed in areas from central Florida through the Bahamas and West Indies and from southern Mexico to the northern parts of South America." [Widespread. No evidence of reproductive failure]

602	Produces viable seed	y
	Source(s)	Notes
	Vozzo, J.A. (2002). Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	"Bursera simaruba is propagated by seeds or cuttings. Seed germination is fast, and percentage germination is between 80 and 100."
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"Fruit collection can be performed from standing trees for sun-drying and storage at ambient temperatures. Seeds are viable for 10 months. Seed germination can be obtained without any treatment, for example, rates of 40% after 22 days (Chavelas Polito and Devall, 1988; Parraguirre Lezama, 1992), although germination rates are improved in the wild by passage through bird or rodent digestive tracts."

603	Hybridizes naturally	
	Source(s)	Notes

Qsn #	Question	Answer
	<p>Weeks, A., & Simpson, B. B. (2004). Molecular genetic evidence for interspecific hybridization among endemic Hispaniolan <i>Bursera</i> (Burseraceae). <i>American Journal of Botany</i>, 91(6): 976-984</p>	<p>"Historically, genetic introgression among species as well as hybrid origins for species of the diploid tree genus <i>Bursera</i> (Burseraceae) have been proposed based on the supposition that individuals morphologically intermediate between sympatric "parent" species must be derived from hybridization. This study reports the first molecular genetic evidence for both unidirectional and reciprocal interspecific hybridization within <i>Bursera</i>. Phylogenies of hybrids and other species in <i>B.</i> subgenus <i>Bursera</i> are reconstructed based on nuclear and chloroplast sequence data. Compelling evidence supports the hybrid origin of three endemic Hispaniolan species: <i>B. brunea</i> (<i>B. nashii</i> 3 <i>B. simaruba</i>), <i>B. gracilipes</i> (<i>B. spinescens</i> 3 <i>B. simaruba</i>), and <i>B. ovata</i> (<i>B. simaruba</i> 3 <i>B. spinescens</i>). Cloning studies of nuclear markers from <i>B. ovata</i> suggests that this species is an introgressed or later backcross generation hybrid and thus reproduces sexually." ... "The need for a revision of Caribbean <i>Bursera</i> is highlighted further by results of this study that indicate interspecific hybridization can complicate species identification (e.g., <i>B. brunea</i>, <i>B. gracilipes</i>, and <i>B. ovata</i>). It is possible that other described species of Caribbean <i>Bursera</i> may be interspecific hybrids that involve the widespread species <i>B. simaruba</i> and the island endemic species."</p>
	<p>Francis, J.K. (1990). <i>Bursera simaruba</i> (L.) Sarg. Burseraceae Bursers family. SO-ITF-SM-M. Institute of Tropical Forestry, USDA Forest Service, Southern Forest Experiment Station, Rio Piedras. Puerto Rico</p>	<p>"There are about 90 species of trees and shrubs in the genus <i>Bursera</i> scattered across tropical America (11, 28). Botanical synonyms for <i>B. simaruba</i> are <i>B. gummifera</i> L., <i>B. ovalifolia</i> (Schlecht.) Engler, and <i>Elaphrium simaruba</i> (L.) Rose (19). Considerable variation in bark color and tree form across the range has led some botanists to believe there may be more than one species of almácigo present (17)." [Unknown]</p>

Qsn #	Question	Answer
604	Self-compatible or apomictic	
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	[Not self-compatible if dioecious] "B. simaruba may be either dioecious or monoecious. The male inflorescence is a panicle, 15 cm or more in length. Individual male flowers are actinomorphic, 6-7 mm in diameter, composed of greenish calyxes 1.5-2 mm in diameter, with rose-coloured to yellow-green or white petals 2-3 mm long and with 8-10 stamens. The female inflorescence is a panicle 10-12 cm long. Female flowers are on short pedicels 2-3 mm long, and have only three petals. They have calyxes and corollas similar to the male flowers, and six cream-coloured, non-functional stamens. The ovary is superior, three-valved and dehiscent (Chavelas Polito and Devall, 1988)."
	Dunphy, B. K. (2003). Direct and indirect measures of gene flow in three tropical dry forest tree species in southwestern Puerto Rico. PhD Dissertation. University of Georgia, Athens	[Selfing almost absent in this species] "The almost total absence of selfing ($tm=0.985$) and the increase in seed abortion in the smaller stands of trees suggests that B. simaruba may have a post fertilization self-incompatibility mechanism." ... "A similar timing of selection against selfed offspring in B. simaruba could explain the fate of these non-germinating seeds. Alternatively, as is prevalent in dry tropical forest species, where mechanical or acid scarification is necessary to overcome seed coat dormancy (Khuruna and Singh 2001), these seeds may have a dormancy mechanism preventing germination. It is also possible that they are mature seeds that simply died while sitting on the ground."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Orwa C., Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 9 Aug 2021]	"In Mexico, insects, especially honeybees, pollinate it."
	Morales, C. M. R. (1999). Frugivory by birds on two subtropical dry forest tree species (Almacigo <i>Bursera simaruba</i> and Guayacan <i>Guaiacum officinale</i>) in Guanica, Puerto Rico. PhD. Diss. University of Colorado, Boulder	"In some areas like Cuba, Guayacan begins flower production in March ending it in May. Little and Wadsworth (1964) report flowering from early spring to fall in Puerto Rico. The trees could remain with flowers for a month (Schubert 1979). Bees and wasps are the main pollinators."
	Dunphy, B. K., & Hamrick, J. L. (2007). Estimation of gene flow into fragmented populations of <i>Bursera simaruba</i> (Burseraceae) in the dry-forest life zone of Puerto Rico. <i>American Journal of Botany</i> , 94 (11): 1786-1794	"It has small (5-7 mm diameter) green flowers that are pollinated by small flies, cerambycid beetles, and other small insects (Stevens, 1983)."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"B. simaruba can also be easily propagated simply by thrusting green branches into the ground, these take root quickly and grow vigorously. It can also be propagated vegetatively after cutting."

Qsn #	Question	Answer
	Nelson, G. (2010). The Trees of Florida. A Reference and Field Guide. 2nd Edition. Pineapple Press Inc, Sarasota, FL	"Gumbo limbo is easy to propagate. A branch thrust into the ground will take root quickly, in much the same way as the willow trees. As a result, the decaying trunks of fallen trees tend to produce several new individuals to replace the one that was lost. Its rapid growth and ease of propagation has made it useful as a living fence post in tropical America."

607	Minimum generative time (years)	>3
	Source(s)	Notes
	Francis, J.K. (1990). <i>Bursera simaruba</i> (L.) Sarg. Burseraceae Bursers family. SO-ITF-SM-M. Institute of Tropical Forestry, USDA Forest Service, Southern Forest Experiment Station, Rio Piedras. Puerto Rico	"Almácigo trees begin fruit production when 5 years old, and even earlier when grown from cuttings."
	Vozzo, J.A. (2002). Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	" <i>Bursera simaruba</i> reaches maturity in approximately 15 years when propagated from seed (Schubert 1985)."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Vozzo, J.A. (2002). Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	"...the fruits are pinkish drupe-like capsules with one or two seeds 6 to 8 mm long. The seeds are dispersed by birds, spider monkeys, and squirrels (Aguilar and Aguilar 1992, Lagos 1977, Stevens 1983, Witsberger and others 1982)." [Fruits & seeds may be occasionally moved by soil movement, but lack means of external attachment and are primarily dispersed by frugivorous animals]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"This species, under forest management for natural stands, is harvested by selective cuttings in Mexico with the aim of conserving the soil, and is also widely used as an ornamental tree. In southern Florida, USA, it is planted as a landscape tree, as a shade tree on the streets and beaches, and as an ornamental in gardens and parks (Chavelas Polito and Devall, 1988). In Mexico it is planted as an ornamental tree from Veracruz to the Yucatan Peninsula (Ruiz Altamirano and Avila Bello, 1994)."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Vozzo, J.A. (2002). Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	"...the fruits are pinkish drupe-like capsules with one or two seeds 6 to 8 mm long. The seeds are dispersed by birds, spider monkeys, and squirrels (Aguilar and Aguilar 1992, Lagos 1977, Stevens 1983, Witsberger and others 1982)." [No evidence of produce contamination, & unlikely given relatively large fruit & seed size]

704	Propagules adapted to wind dispersal	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Trainer, J. M., & Will, T. C. (1984). Avian methods of feeding on <i>Bursera simaruba</i> (Burseraceae) fruits in Panama. <i>The Auk</i> 101(1): 193-195	"The fruits, fleshy egg-shaped capsules about 1 cm in length, had a leathery green skin (pericarp) over a thin layer of bright pink aril covering one or two one-seeded nutlets. The abundant fruits were conspicuous because the tree we observed had lost most of its leaves." [Fleshy-fruited & dispersed by birds & other frugivorous animals]

705	Propagules water dispersed	
	Source(s)	Notes
	Vozzo, J.A. (2002). <i>Tropical Tree Seed Manual</i> . USDA Forest Service, Washington, D.C.	"the fruits are pinkish drupe-like capsules with one or two seeds 6 to 8 mm long. The seeds are dispersed by birds, spider monkeys, and squirrels (Aguilar and Aguilar 1992, Lagos 1977, Stevens 1983, Witsberger and others 1982)." [Fruits may be secondarily dispersed by water, but the tree is adapted for frugivory & internal dispersal of seeds]
	Graham, C., Martínez-Leyva, J. E., & Cruz-Paredes, L. (2002). Use of Fruiting Trees by Birds in Continuous Forest and Riparian Forest Remnants in Los Tuxtlas, Veracruz, Mexico. <i>Biotropica</i> , 34(4): 589-597	[Occurrence along riparian areas suggests seeds may be secondarily moved by water after dispersal by birds] "TABLE 3. Percentages by species of visitation frequency, consistency of visitation (percentage of total tree observation period during which a given bird species was noted), and fruit consumption for <i>Bursera simaruba</i> trees in continuous forest and riparian remnants for the 15 most frequent avian consumers"

Qsn #	Question	Answer
706	Propagules bird dispersed	y
	Source(s)	Notes
	Graham, C., Martínez-Leyva, J. E., & Cruz-Paredes, L. (2002). Use of Fruiting Trees by Birds in Continuous Forest and Riparian Forest Remnants in Los Tuxtlas, Veracruz, Mexico. <i>Biotropica</i> , 34(4): 589-597	"Forty and 39 bird species consumed fruits of <i>Dendropanax</i> and <i>Bursera</i> , respectively (Appendix 1)." ... "Species that foraged in <i>Bursera</i> were for the most part habitat generalists and were common in both continuous and disturbed habitats." ... "In Los Tuxtlas, various bird species visited <i>Bursera</i> consistently across the fruiting season and some were likely important dispersers"
	Morales, C. M. R. (1999). Frugivory by birds on two subtropical dry forest tree species (<i>Almácigo Bursera simaruba</i> and <i>Guayacan Guaiacum officinale</i>) in Guanica, Puerto Rico. PhD. Diss. University of Colorado, Boulder	"The sugar-rich fruits produced by <i>Bursera simaruba</i> attract a large and diverse guild of opportunistic frugivores that are probably in need of not only a quick supply of energy but a reliable source of water. Except for the migrant Black-whiskered Vireo, the exploitation efficiency of fruits is more or less the same among all the frugivorous birds."
	Trainer, J. M., & Will, T. C. (1984). Avian methods of feeding on <i>Bursera simaruba</i> (<i>Burseraceae</i>) fruits in Panama. <i>The Auk</i> 101(1): 193-195	"We observed 26 species of birds and noted the feeding method used by each when taking fruits of a single <i>Bursera simaruba</i> tree in Panama (Table 1). The Icterinae, represented by five species, showed the greatest diversity in feeding methods and differed from one another in feeding rate, in handling time (Table 2), and probably in dispersal consequences for <i>B. simaruba</i> . The two oriole species, which depend least on fruit in the diet (Bent 1958), also fed least efficiently and probably provided the poorest seed dispersal." ... "Most visitors swallowed the fruits, but some species consistently dropped the nutlets under the tree or left them on the tree. During this study five bird species appeared to be the most effective seed dispersers on the basis of feeding method, number of individuals visiting the tree, number of days seen at the tree, and foraging rate"

707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	Hammond, D. S. (1995). Post-dispersal seed and seedling mortality of tropical dry forest trees after shifting agriculture, Chiapas, Mexico. <i>Journal of Tropical Ecology</i> , 11(2), 295-313	" <i>Bursera simaruba</i> is the most common canopy member in the forest near the study site (4-12 trees (>10 cm dbh) ha ⁻¹). Fruits are mature from March to April. The red drupe consists of a fleshy, two-valved pericarp. Enclosed are 1- 2 seeds (dry mass 129±1 (1 SE) mg; volume 192 ± 12 mm ³ ; N = 64) covered by a thin pink or yellow/orange aril. <i>Bursera</i> is an important dry season source of food for many tropical and migrant bird species (Scott & Martin 1984). Most birds visiting individuals in fruit appear to consume the seeds entirely, releasing the seeds by regurgitation or defecation (Trainer & Will 1984). At the study site, seeds of <i>Bursera</i> were typically found dispersed in groups of 1-5 seeds, though larger birds, such as <i>Calocitta formosa</i> , may disperse clumps of up to 12 seeds (D. Hammond, pers. obs.)." ... "In most instances, animals handling the seeds were more likely to eat them in situ or carry them away before burying them in the vicinity. Two of the species, <i>Swietenia</i> and <i>Bursera</i> , were buried in less than 1% of cases." [Seeds may rarely be transported externally, but are generally dispersed internally or destroyed by seed predators]

708	Propagules survive passage through the gut	y
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Qsn #	Question	Answer
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"...germination rates are improved in the wild by passage through bird or rodent digestive tracts."
	Vozzo, J.A. (2002). Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	"the fruits are pinkish drupe-like capsules with one or two seeds 6 to 8 mm long. The seeds are dispersed by birds, spider monkeys, and squirrels (Aguilar and Aguilar 1992, Lagos 1977, Stevens 1983, Witsberger and others 1982). In Costa Rica the fruits are a major food source for white-faced monkeys."

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Francis, J.K. (1990). <i>Bursera simaruba</i> (L.) Sarg. Burseraceae Bursers family. SO-ITF-SM-M. Institute of Tropical Forestry, USDA Forest Service, Southern Forest Experiment Station, Rio Piedras. Puerto Rico	"Large trees can produce up to 60,000 seeds in one crop, but the average is close to 600 seeds per tree" [Potentially for large trees]

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	Notes
	Ray, G. J. and Brown, B. J. (1994). Seed Ecology of Woody Species in a Caribbean Dry Forest. <i>Restoration Ecology</i> , 2: 156–163	" <i>Bursera simaruba</i> seeds germinated poorly «10% in this test, as well as in most of 33 shadehouse germination trials of fresh seeds, and their germinability diminished to 2% in five months." ... "
	Orwa C., Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 12 Aug 2021]	"Seed storage behaviour is orthodox. Seeds remain viable for 10 months."
	Sautu, A., Baskin, J. M., Baskin, C. C., & Condit, R. (2006). Studies on the seed biology of 100 native species of trees in a seasonal moist tropical forest, Panama, Central America. <i>Forest Ecology and Management</i> , 234(1): 245-263	"Table 1. Results of germination and other studies of seeds of 100 species native to the Panama Canal watershed" [<i>Bursera simaruba</i> - Longevity (months) = +5]

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. (2021). 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
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"- Ability to regenerate rapidly; coppice; pollard"

Qsn #	Question	Answer
	Francis, J.K. (1990). <i>Bursera simaruba</i> (L.) Sarg. Burseraceae Bursers family. SO-ITF-SM-M. Institute of Tropical Forestry, USDA Forest Service, Southern Forest Experiment Station, Rio Piedras. Puerto Rico	"Coppicing is vigorous when sapling to small sawlog-sized trees .are cut (author, personal observation), and windthrown trees are reported to sprout and regenerate themselves (24). After stands of trees have been cut, coppicing is probably a more important means of reproduction than seeds."
	National Research Council (U.S.). Advisory Committee on Technology Innovation. (1983). Firewood crops: shrub and tree species for energy production : volume 2. National Academy Press, Washington, D.C.	"The trees regenerate swiftly after cutting. In fact, even trees blown down by winds send up shoots, which soon become trunks as big as the original."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Elevation range exceeds 1000 m, demonstrating some environmental versatility
- Naturalized in Kona, Hawaii & possibly naturalized in Bermuda
- Branches break easily
- Combustible resin in bark and wood could increase fire risk
- Facultatively shade tolerant
- Tolerates many soil types
- Reported to form pure stands
- Can reproduce vegetatively
- Viable seeds dispersed by birds and other frugivorous animals
- Regenerates swiftly after cutting & fires

Low Risk Traits

- No reports of detrimental impacts or invasiveness to date (but not widely cultivated)
- Unarmed (no spines, thorns or burrs)
- Fodder tree (palatable to grazing animals)
- Non-toxic
- Ornamental
- Reaches maturity in 5-15 years
- Mostly self-incompatible (selfing rare)