

Taxon: Firmiana simplex (L.) W. Wight	Family: Malvaceae
Common Name(s): Chinese bottletree Chinese parasol tree Japanese varnish tree phoenix tree	Synonym(s): Firmiana platanifolia (L. f.) Schott & Hibiscus simplex L. Sterculia platanifolia L. f.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 8 Dec 2016
WRA Score: 8.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Naturalized Tree, Environmental Weed, Ornamental Self-Seeding, Wind-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)	Intermediate
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	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)	y
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	n
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	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	y=1, n=0	n

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	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)	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	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	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	n

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2007. Flora of China. Vol. 12 (Hippocastanaceae through Theaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence of domestication] "Widely cultivated. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan; cultivated in Europe and North America (United States)]."

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"	Intermediate
	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 7 Dec 2016]	"Native: Asia-Temperate China: China - Anhui, - Fujian, - Guangdong, - Guangxi, - Guizhou, - Hainan, - Hubei, - Hunan, - Jiangsu, - Jiangxi, - Shaanxi, - Shandong, - Shanxi, - Sichuan, - Yunnan, - Zhejiang Eastern Asia: Japan - Honshu, - Kyushu, - Ryukyu Islands, - Shikoku; Taiwan"

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 7 Dec 2016]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Grimm, W. C. (2002). Illustrated Book of Trees: The Comprehensive Field Guide to More than 250 Trees of Eastern North America. Stackpole Books, Mechanicsburg, PA	"Although it is most commonly seen in the South from Florida to Texas, it is hardy to Washington, D.C."

Qsn #	Question	Answer
	Upton, T. M., & Cullen, J. (2012). 736. <i>Firmiana simplex</i> . Curtis's Botanical Magazine, 29(2), 170-181	"Grows in the mixed deciduous broad-leaved, warm temperate forests, through to the evergreen broad-leaved forests in subtropical zones at low altitudes up to ca. 800 m."
	Dave's Garden. (2016). Chinese Parasol Tree, Varnish Tree - <i>Firmiana simplex</i> . http://davesgarden.com/guides/pf/go/53113/ . [Accessed 8 Dec 2016]	"Hardiness: USDA Zone 7b: to -14.9 °C (5 °F) USDA Zone 8a: to -12.2 °C (10 °F) USDA Zone 8b: to -9.4 °C (15 °F) 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)"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Nelson, G., Earle, C.J. & Spellenberg, R. 2014. Trees of Eastern North America. Princeton University Press, Princeton, NJ	"Introduced from subtropical China; cultivated, established in the East from Md. south to n. Fla., west to Ark. and c. Tex."
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 7 Dec 2016]	"Native: Asia-Temperate China: China - Anhui, - Fujian, - Guangdong, - Guangxi, - Guizhou, - Hainan, - Hubei, - Hunan, - Jiangsu, - Jiangxi, - Shaanxi, - Shandong, - Shanxi, - Sichuan, - Yunnan, - Zhejiang Eastern Asia: Japan - Honshu, - Kyushu, - Ryukyu Islands, - Shikoku; Taiwan"
	Upton, T. M., & Cullen, J. (2012). 736. <i>Firmiana simplex</i> . Curtis's Botanical Magazine, 29(2), 170-181	"This species thrives best in warm temperate areas where a hot and dry summer enables the wood to mature sufficiently to survive any winter cold."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Upton, T. M., & Cullen, J. (2012). 736. <i>Firmiana simplex</i> . Curtis's Botanical Magazine, 29(2), 170-181	"The Chinese parasol tree, <i>Firmiana simplex</i> , is planted widely in streets and parks, particularly in China and Japan but also in southern Europe and the warmer parts of the USA."
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2007. Flora of China. Vol. 12 (Hippocastanaceae through Theaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Widely cultivated." ... "cultivated in Europe and North America (United States)"

301	Naturalized beyond native range	y
	Source(s)	Notes

Qsn #	Question	Answer
	Georgia Exotic Pest Plant Council. (2006). List of Non-Native Invasive Plants in Georgia. Wildland Weeds 9(4): 15-18	"Category 4 - A naturalized exotic plant (self-sustaining outside of cultivation) in Georgia but generally not a problem in Georgia natural areas, or a potentially invasive plant but additional information is needed to determine its true status." [Firmiana simplex included in this category]
	Miller, J.H., Chambliss, E.B. & Loewenstein, N.J. (2010). A Field Guide for the Identification of Invasive Plants in Southern Forests. General Technical Report SRS-119. USDA Forest Service, Southern Research Station, Asheville, NC	"Distribution. Found as escaped plants and small groups more frequently in the coastal States but throughout the region except in KY and north TN, with northward spread expected."
	Cothran, J. R. (2004). Treasured ornamentals of southern gardens Michaux's lasting legacy. Castanea, 69(sp2), 149-157	"Grown as a prized exotic when initially introduced, this somewhat invasive plant often escaped cultivation and became naturalized in many areas of the lower and middle South. Today this exotic tree is often used as a decorative ornamental in gardens throughout this region."
	Upton, T. M., & Cullen, J. (2012). 736. Firmiana simplex. Curtis's Botanical Magazine, 29(2), 170-181	"Often cited as native to Japan it is almost certainly introduced and again widely planted and sometimes naturalised (Ohwi, 1965). It is also widely cultivated in the SE and W of the USA and is sometimes invasive in Texas."
	Zerbe, S., Choi, I. K., & Kowarik, I. (2004). Characteristics and habitats of non-native plant species in the city of Chonju, southern Korea. Ecological Research, 19(1), 91-98	"Table 2 List of the non-native species recorded in the city of Chonju, ordered according to their frequency in the sample plots" [Firmiana simplex - Spontaneous rejuvenation of woody species in the herb layer]

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	Miller, J. H., Manning, S. T., & Enloe, S. F. (2015). A Management Guide for Invasive Plants in Southern Forests. General Technical Report SRS-131. USDA Forest Service, Southern Research Station, Asheville, NC.	"Many surface roots can lift sidewalks in urban plantings and sprout after tree kill."
	Dave's Garden. (2016). Chinese Parasol Tree, Varnish Tree - Firmiana simplex. http://davesgarden.com/guides/pf/go/53113/ . [Accessed 8 Dec 2016]	[Yard and landscaping weed] "On Apr 10, 2011, gigi4two from Spring Hill, FL wrote: ... I agree that the plant does provide wonderful shade and the leaves and trunk are very pretty. That being said, the negative about this tree is that it's over-running my (smallish) backyard, as well as all of the neighboring yards." ... "On May 16, 2010, scschul from Birmingham, AL wrote: please help me. my yard is over run with this plant. i'm sure if i only had one tree there would be no problem. they are everywhere!! i don't know how to get rid of them. if anyone knows, please let me know."

303	Agricultural/forestry/horticultural 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

304	Environmental weed	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Cho, G., Inoue, H., Burckhardt, D., & Lee, S. (2016). The identity of the <i>Carsidara</i> species (Hemiptera: Psylloidea: Carsidaridae) associated with <i>Firmiana simplex</i> (Malvaceae) in Japan and Korea. <i>Zootaxa</i> , 4171(2), 395-400	"In the Southern U.S., the Chinese parasol tree replaces easily native tree species and thereby represents a serious threat to the environment."
	Boyce, R. L. (2009). Invasive shrubs and forest tree regeneration. <i>Journal of Sustainable Forestry</i> , 28(1-2), 152-217	"TABLE 6 Direct and Indirect Effects of Invasive Shrubs on Native Forest Ecosystems" [<i>Firmiana simplex</i> - Direct effects = Shades out seedlings]
	Flora of North America Editorial Committee, eds. 1993+. <i>Flora of North America North of Mexico</i> . 19+ vols. New York and Oxford	"The species is considered an invasive tree in the southeastern states, but only a few occurrences of its being naturalized have been well documented."
	Siebenthaler, J. (2016). Controlling The Chinese Parasol Tree In West Feliciana Parish, Louisiana. http://www.siebenthalercreative.com/acc/chineseparasol/ . [Accessed 8 Dec 2016]	"Whether as seedlings, saplings or mature trees, they've evolved to successfully block light from reaching the forest floor regardless of growth stage, thereby preventing all but a few hardy indigenous species from surviving. From Savannah, Georgia west to Austin, Texas and Santa Barbara, California, this pest is recognized nationwide as a major biological threat in varying stages of prohibition and is listed by the U.S. Department of Agriculture as such on the invasive species web site. Unfortunately, Louisiana to date has yet to fully address the horrendous environmental and economic impact of this uncontrolled invader. "

305	Congeneric weed	n
	Source(s)	Notes
	Randall, R.P. 2012. <i>A Global Compendium of Weeds</i> . 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2007. <i>Flora of China</i> . Vol. 12 (Hippocastanaceae through Theaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Deciduous trees, up to 16 m tall; bark greenish, smooth. Petiole 15–30 cm; leaf blade cordate, palmately 3–5-lobed, 15– 30 cm in diam., lobes triangular, both surfaces glabrous or minutely puberulent, basal veins 7, base cordate, apex acuminate."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

Qsn #	Question	Answer
403	Parasitic	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2007. Flora of China. Vol. 12 (Hippocastanaceae through Theaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Deciduous trees, up to 16 m tall; bark greenish, smooth."
404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Agetsuma, N., Agetsuma-Yanagihara, Y., & Takafumi, H. 2011. Food habits of Japanese deer in an evergreen forest: Litter-feeding deer. Mammalian Biology-Zeitschrift für Säugetierkunde, 76(2): 201-207	"Appendix Identified food species and part of Japanese sika deer in a warm temperate broad leaved forest" [Firmiana simplex - fallen & living leaves are consumed]
	Dular, A. K. (2015). Plant diversity assessment of Sariska tiger reserve in Aravallis with emphasis on minor forest products. Tropical Plant Research, 2(1), 30-35	"Table 3. Includes the list of plant species utilized as fodder in Sariska Tiger Reserve" [Firmiana simplex - Green leaf twigs]
405	Toxic to animals	n
	Source(s)	Notes
	Plants for a Future. (2016). Firmiana simplex. http://www.pfaf.org/user/Plant.aspx?LatinName=Firmiana+simplex . [Accessed 8 Dec 2016]	"Known Hazards - None known"
	Agetsuma, N., Agetsuma-Yanagihara, Y., & Takafumi, H. 2011. Food habits of Japanese deer in an evergreen forest: Litter-feeding deer. Mammalian Biology-Zeitschrift für Säugetierkunde, 76(2): 201-207	[No evidence] "Appendix Identified food species and part of Japanese sika deer in a warm temperate broad leaved forest" [Firmiana simplex - fallen & living leaves are consumed]
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Missouri Botanical Garden. (2016). Firmiana simplex. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=c819 . [Accessed 8 Dec 2016]	"Problems - No serious insect or disease problems."
	Odenwald, N.G., Fryling, C.F. & Pope, T.E. 2004. Plants for American Landscapes. LSU Press, Baton Rouge, LA	"The tree is very susceptible to scale insects, however, and these are best controlled with a systemic insecticide."
	Flint, H.L. & Lyverse, J.M. 1997. Landscape plants for eastern North America: exclusive of Florida and the immediate Gulf Coast. John Wiley and Sons, New York, NY	"This tree is unusually free of pest problems."
407	Causes allergies or is otherwise toxic to humans	n

Qsn #	Question	Answer
	Source(s)	Notes
	Plants for a Future. (2016). <i>Firmiana simplex</i> . http://www.pfaf.org/user/Plant.aspx?LatinName=Firmiana+simplex . [Accessed 8 Dec 2016]	"Known Hazards - None known"
	Upson, T. M., & Cullen, J. (2012). 736. <i>Firmiana simplex</i> . <i>Curtis's Botanical Magazine</i> , 29(2), 170-181	"The globose seeds are edible and occasionally eaten in China (Valder, 1999). In addition to its horticultural qualities this species is also utilised for its wood and potential medicinal properties. In China the wood is utilised for wind instruments and due to its superior sonic properties, is used for the soundboards of several Chinese instruments, including the guqin and guzheng."
	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

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	ACT Government. (2015). <i>Design Standards for Urban Infrastructure. Plant Species for Urban Landscape Projects in Canberra - Botanical Name: Firmiana simplex (FIs)</i> . http://www.tccs.act.gov.au/ . [Accessed 8 Dec 2016]	"Very low flammability"
	Miller, J.H., Chambliss, E.B. & Loewenstein, N.J. (2010). <i>A Field Guide for the Identification of Invasive Plants in Southern Forests. General Technical Report SRS-119</i> . USDA Forest Service, Southern Research Station, Asheville, NC	[Not listed among impacts] "Occasional ornamental plantings in the southern half of the region are a source of escaped plants in surrounding roadsides, riparian areas, and forest margins. Rapid early growth. Readily self-pollinates and self-seeds, and thus it is thought that a single, reproductive age tree can produce an entire colony. Nectaries in flowers suggest insect pollination. Spreads and forms infestations by wind- and water-dispersed seeds. The high fat seed has not been observed as spread by wildlife. Root sprouts have not been observed."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Dirr, M.A. 2011. <i>Dirr's encyclopedia of trees and shrubs</i> . Timber Press, Portland, OR	"Adaptable, and I mean adaptable. Sun or shade."
	Miller, J. H., Manning, S. T., & Enloe, S. F. (2015). <i>A Management Guide for Invasive Plants in Southern Forests. General Technical Report SRS-131</i> . USDA Forest Service, Southern Research Station, Asheville, NC.	"Seedlings will persist in shade, growing rapidly tall to reach sunlight, while saplings and trees require partial to full sunlight."
	Dave's Garden. (2016). <i>Chinese Parasol Tree, Varnish Tree - Firmiana simplex</i> . http://davesgarden.com/guides/pf/go/53113/ . [Accessed 8 Dec 2016]	"Sun Exposure: Sun to Partial Shade"
	Gilman, E.F. & Watson, D.G. 1993. <i>Firmiana simplex: Chinese Parasol tree. Fact Sheet ENH418</i> . Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. http://hort.ifas.ufl.edu/ . [Accessed 8 Dec 2016]	"Trees will grow in shade with an upright, almost columnar form as they reach for the sunlight."

Qsn #	Question	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Upson, T. M., & Cullen, J. (2012). 736. <i>Firmiana simplex</i> . Curtis's Botanical Magazine, 29(2), 170-181	"It does well in most free-draining fertile soils with adequate moisture."
	Gilman, E.F. & Watson, D.G. 1993. <i>Firmiana simplex</i> : Chinese Parasoltree. Fact Sheet ENH418. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. http://hort.ifas.ufl.edu/ . [Accessed 8 Dec 2016]	"Soil tolerances: clay; sand; loam; acidic; alkaline; well-drained"
	Grimm, W. C. (2002). Illustrated Book of Trees: The Comprehensive Field Guide to More than 250 Trees of Eastern North America. Stackpole Books, Mechanicsburg, PA	"tolerant of nearly any soil type."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2007. Flora of China. Vol. 12 (Hippocastanaceae through Theaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Deciduous trees, up to 16 m tall; bark greenish, smooth."

412	Forms dense thickets	y
	Source(s)	Notes
	Siebenthaler, J. (2016). Controlling The Chinese Parasol Tree In West Feliciana Parish, Louisiana. http://www.siebenthalercreative.com/acc/chineseparasol/ . [Accessed 8 Dec 2016]	"Drought tolerant and cold hardy, this messy deciduous intruder quickly spreads, becoming so dense in just a few seasons that what from only a few feet away looks like a healthy forest is in fact a single species monosystem, rivaling other despised and horrendously destructive pests like Chinese tallow, Brazilian pepper, and Melaleuca."

501	Aquatic	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2007. Flora of China. Vol. 12 (Hippocastanaceae through Theaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Terrestrial] "Deciduous trees, up to 16 m tall; bark greenish, smooth."

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 8 Dec 2016]	Family: Malvaceae Subfamily: Sterculioideae

503	Nitrogen fixing woody plant	n
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Qsn #	Question	Answer
	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 8 Dec 2016]	Family: Malvaceae Subfamily: Sterculioideae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2007. Flora of China. Vol. 12 (Hippocastanaceae through Theaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Deciduous trees, up to 16 m tall; bark greenish, smooth."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2007. Flora of China. Vol. 12 (Hippocastanaceae through Theaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Widely cultivated. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan; cultivated in Europe and North America (United States)]."

602	Produces viable seed	y
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2007. Flora of China. Vol. 12 (Hippocastanaceae through Theaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Follicle membranous, stalked, foliaceous, 6–11 × 1.5–2.5 cm, 2–4-seeded, abaxially puberulent or nearly glabrous. Seeds globose, ca. 7 mm in diam., wrinkled."
	Upson, T. M., & Cullen, J. (2012). 736. <i>Firmiana simplex</i> . Curtis's Botanical Magazine, 29(2), 170-181	"New plants are best propagated by sowing fresh seed once it has ripened."

603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Cho, G., Inoue, H., Burckhardt, D., & Lee, S. (2016). The identity of the Carsidara species (Hemiptera: Psylloidea: Carsidaridae) associated with <i>Firmiana simplex</i> (Malvaceae) in Japan and Korea. Zootaxa, 4171(2), 395-400	" <i>Firmiana simplex</i> grows rapidly, readily self-pollinates and self-seeds, and it is thought that a single, reproductive tree can produce an entire colony."

Qsn #	Question	Answer
	Miller, J.H., Chambliss, E.B. & Loewenstein, N.J. (2010). A Field Guide for the Identification of Invasive Plants in Southern Forests. General Technical Report SRS-119. USDA Forest Service, Southern Research Station, Asheville, NC	"Readily self-pollinates and self-seeds, and thus it is thought that a single, reproductive age tree can produce an entire colony."
	Missouri Botanical Garden. (2016). <i>Firmiana simplex</i> . http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=c819 . [Accessed 8 Dec 2016]	"Trees will self-seed somewhat aggressively."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Miller, J.H., Chambliss, E.B. & Loewenstein, N.J. (2010). A Field Guide for the Identification of Invasive Plants in Southern Forests. General Technical Report SRS-119. USDA Forest Service, Southern Research Station, Asheville, NC	"Flowers. May to July. Large, branched panicles over 2 feet (60 cm) across of tan and yellow flowers, from the base of new growth. Branches green to pale green. Separate male and female flowers occur in each cluster and open at varying times. Slightly fragrant. Male flowers turn reddish pink before petals fall." ... "Nectaries in flowers suggest insect pollination."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Miller, J.H., Chambliss, E.B. & Loewenstein, N.J. (2010). A Field Guide for the Identification of Invasive Plants in Southern Forests. General Technical Report SRS-119. USDA Forest Service, Southern Research Station, Asheville, NC	"Root sprouts have not been observed."

607	Minimum generative time (years)	>3
	Source(s)	Notes
	Dave's Garden. (2016). Chinese Parasol Tree, Varnish Tree - <i>Firmiana simplex</i> . http://davesgarden.com/guides/pf/go/53113/ . [Accessed 8 Dec 2016]	"We inherited one of the Chinese parasol trees with our home thirty years ago. It was brought to my husband's grandfather from Texas 20 years prior to that as a seedling. The unusual thing about it was that it never produced flowers or seed until about 15 years ago and it was all of the sudden and for no obvious reason."
	Upson, T. M., & Cullen, J. (2012). 736. <i>Firmiana simplex</i> . <i>Curtis's Botanical Magazine</i> , 29(2), 170-181	"[Cultivated plant took 17 years to reach maturity] "At Cambridge University Botanic Garden a seedling was planted in a south facing bay of the tropical glasshouses in 1990, where for many years its large leaves gave a tropical accent to the plantings." ... "In mid June 2007 developing inflorescences were noted which eventually opened in the second week of August, lasting through until mid-September."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes

Qsn #	Question	Answer
	Miller, J.H., Chambliss, E.B. & Loewenstein, N.J. (2010). A Field Guide for the Identification of Invasive Plants in Southern Forests. General Technical Report SRS-119. USDA Forest Service, Southern Research Station, Asheville, NC	[Possibly. Occurs in & established along roadsides] "Fruit and seeds. June to April. Quickly after flowering, 1 to 5 pea-size dry fruit appear along the upper margins of unique drooping petal-like curved sections, 2.5 to 3 inches (6 to 8 cm) long and 4 to 5 in a flower-like group, initially light green turning tan, thin and wafery. Panicle branches with fruit drop throughout winter leaving star-shaped woody flower bases at branch ends." ... "Occasional ornamental plantings in the southern half of the region are a source of escaped plants in surrounding roadsides, riparian areas, and forest margins."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Upson, T. M., & Cullen, J. (2012). 736. <i>Firmiana simplex</i> . Curtis's Botanical Magazine, 29(2), 170-181	"The Chinese parasol tree, <i>Firmiana simplex</i> , is planted widely in streets and parks, particularly in China and Japan but also in southern Europe and the warmer parts of the USA."
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2007. Flora of China. Vol. 12 (Hippocastanaceae through Theaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Widely cultivated." ... "cultivated in Europe and North America (United States)"

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Miller, J.H., Chambliss, E.B. & Loewenstein, N.J. (2010). A Field Guide for the Identification of Invasive Plants in Southern Forests. General Technical Report SRS-119. USDA Forest Service, Southern Research Station, Asheville, NC	[No evidence. Large tree with relatively large seeds & long time to maturity] "Deciduous upright tree to 50 feet (16 m) in height and 2 feet (60 cm) in trunk diameter with stout alternate branches." ... "Fruit and seeds. June to April. Quickly after flowering, 1 to 5 pea size dry fruit appear along the upper margins of unique drooping petal-like curved sections, 2.5 to 3 inches (6 to 8 cm) long and 4 to 5 in a flower-like group, initially light green turning tan, thin and wafery. Panicle branches with fruit drop throughout winter leaving star-shaped woody flower bases at branch ends."

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Miller, J.H., Chambliss, E.B. & Loewenstein, N.J. (2010). A Field Guide for the Identification of Invasive Plants in Southern Forests. General Technical Report SRS-119. USDA Forest Service, Southern Research Station, Asheville, NC	"Spreads and forms Infestations by wind- and wafer-dispersed seeds."
	Siebenthaler, J. (2016). Controlling The Chinese Parasol Tree In West Feliciana Parish, Louisiana. http://www.siebenthalercreative.com/acc/chineseparasol/ . [Accessed 8 Dec 2016]	"The seeds — unusual in that they're arrayed around the perimeter of the ersatz leaf (above left) — are well designed for widespread aerial dispersal from heights of 50, 60, 70 feet and higher. They drift down or are scattered by the wind in overwhelming numbers that easily germinate in massive quantities, rapidly suppressing through sheer numbers even the hardiest plants. "

705	Propagules water dispersed	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Miller, J.H., Chambliss, E.B. & Loewenstein, N.J. (2010). A Field Guide for the Identification of Invasive Plants in Southern Forests. General Technical Report SRS-119. USDA Forest Service, Southern Research Station, Asheville, NC	"Spreads and forms Infestations by wind- and wafer-dispersed seeds."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Miller, J.H., Chambliss, E.B. & Loewenstein, N.J. (2010). A Field Guide for the Identification of Invasive Plants in Southern Forests. General Technical Report SRS-119. USDA Forest Service, Southern Research Station, Asheville, NC	"The high fat seed has not been observed as spread by wildlife".

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Miller, J.H., Chambliss, E.B. & Loewenstein, N.J. (2010). A Field Guide for the Identification of Invasive Plants in Southern Forests. General Technical Report SRS-119. USDA Forest Service, Southern Research Station, Asheville, NC	"Spreads and forms infestations by wind- and water-dispersed seeds. The high fat seed has not been observed as spread by wildlife."

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Miller, J.H., Chambliss, E.B. & Loewenstein, N.J. (2010). A Field Guide for the Identification of Invasive Plants in Southern Forests. General Technical Report SRS-119. USDA Forest Service, Southern Research Station, Asheville, NC	"The high fat seed has not been observed as spread by wildlife." [Unlikely to be consumed or internally dispersed]

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	Siebenthaler, J. (2016). Controlling The Chinese Parasol Tree In West Feliciana Parish, Louisiana. http://www.siebenthalercreative.com/acc/chineseparasol/ . [Accessed 8 Dec 2016]	"But the overwhelming dominant tree throughout was Firmiana simplex, by the many hundreds of mature trees, thousands of understory saplings, and tens of thousands of seedlings on our acreage alone."
	Boyce, R. L. (2009). Invasive shrubs and forest tree regeneration. Journal of Sustainable Forestry, 28(1-2), 152-217	"TABLE 4 Reproduction Characteristics of Invasive Shrub Species." [Firmiana simplex - Heavy fruit crop]

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	Notes

Qsn #	Question	Answer
	Royal Botanic Gardens Kew. (2016) Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/ . [Accessed 8 Dec 2016]	"Storage Behaviour: No data available for species or genus. Of 535 known taxa of family MALVACEAE, 95.70% Orthodox(p/?), 2.06% Recalcitrant(?), 0.37% Intermediate(?), 1.87%Uncertain"
	Liu, Q., Liu, Y. L., Zhang, W. F., Chen, L., & Wang, W. (2012) <i>Firmiana platanifolia</i> Seed Moisture Content and Chemical Composition Analysis and Evaluation. <i>Guizhou Agricultural Sciences</i> , 5, 051	[Longevity in soil seed bank unknown] "F. platanifolia seeds could be stored for 3~15 years. The seed had higher unsaturated fatty acid content and many kinds of amino acids." [<i>Firmiana platanifolia</i> (L. f.) Schott & Endl. Synonym of <i>Firmiana simplex</i>]

803	Well controlled by herbicides	y
	Source(s)	Notes
	Siebenthaler, J. (2016). Controlling The Chinese Parasol Tree In West Feliciana Parish, Louisiana. http://www.siebenthalercreative.com/acc/chineseparasol/ . [Accessed 8 Dec 2016]	"Brian's tried and tested hack and squirt method uses a sharp hatchet to first slash the extremely tough mature bark several times, followed by a dose of full strength herbicide sprayed directly into the wound with a squirt bottle full of glyphosate (RoundUp Ultra.) He's able to cover ground quickly, allowing the tree's own hydrology to distribute the chemical from the canopy to the roots for 100% die-off based on a single treatment that can be administered nearly any time of year. (Note: glyphosate is also available as a less expensive Monsanto branded Honcho 41% solution in 2.5 gallon quantities.) This method is very efficient, especially for treating larger trees, but there is one drawback to hack and squirt: the trees quickly die in place, but don't decay as rapidly as when felled to the ground. " ... "Compared to the alternative (chain saw) though, hack and squirt is definitely much safer to administer initially, easier and faster to apply, less destructive of any adjacent beneficial vegetation, and 100% effective in killing the tree and any subsequent suckers."
	Miller, J. H., Manning, S. T., & Enloe, S. F. (2015). A Management Guide for Invasive Plants in Southern Forests. General Technical Report SRS-131. USDA Forest Service, Southern Research Station, Asheville, NC.	"Large trees. Make stem injections using a glyphosate herbicide or Garlon 3A in dilutions and cut-spacings specified on the herbicide label. For stems too tall for foliar sprays, cut large stems and immediately treat the stump tops with a glyphosate herbicide or Garlon 3A as a 30-percent solution (7 pints per 3-gallon mix) or Garlon 4 as a 25-percent solution (3 quarts per 3-gallon mix), and add a penetrant for more effective control. ORTHO Brush-B-Gon and Enforcer Brush Killer are effective undiluted for treating cut-stumps and available in retail garden stores (safe to surrounding plants). Saplings. Apply a basal spray for trees up to 4 inches in diameter, using Garlon 4 as a 30 percent solution (7 pints per 3-gallon mix) in a labeled basal oil product, vegetable oil or mineral oil with a penetrant, or fuel oil or diesel fuel (where permitted). Seedlings and saplings. Thoroughly wet all leaves with one of the following herbicides in water with a surfactant: a glyphosate herbicide as a 4-percent solution (1 pint per 3-gallon mix) whenever green foliage is present and when safety to surrounding plants is desired; or Arsenal AC* as a 0.5-percent solution (2 ounces per 3-gallon mix), or Arsenal PowerLine* as a 1-percent solution (4 ounces per 3-gallon mix)."

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

Qsn #	Question	Answer
	Upton, T. M., & Cullen, J. (2012). 736. <i>Firmiana simplex</i> . Curtis's Botanical Magazine, 29(2), 170-181	"It is known for its ease of transplanting, even large mature; in China large specimens with trunks of over 10 m in height are transplanted, requiring the use of cranes. This entails the removal of much of the root system and hard pruning of the canopy, and these trees, wrapped for protection in hessian sacking, can be a common sight along newly constructed or repaired streets."
	Dave's Garden. (2016). Chinese Parasol Tree, Varnish Tree - <i>Firmiana simplex</i> . http://davesgarden.com/guides/pf/go/53113/ . [Accessed 8 Dec 2016]	[Can tolerate regular pruning] "My 1st tree is over 40' tall and spreads over 25' wide!! and, I'm always pruning it --- trying to keep it in the confines of my own yard, although it's too late for that now!"

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	n
	Source(s)	Notes
	Cho, G., Inoue, H., Burckhardt, D., & Lee, S. (2016). The identity of the <i>Carsidara</i> species (Hemiptera: Psylloidea: Carsidaridae) associated with <i>Firmiana simplex</i> (Malvaceae) in Japan and Korea. <i>Zootaxa</i> , 4171(2), 395-400	[Proposed for biological control on mainland USA] "As very host specific organisms, psyllids have been used or considered in several cases for biological control of weeds (e.g. in Florida <i>Boreioglycaspis melaleucae</i> Moore, 1964 against <i>Melaleuca quinquenervia</i> or <i>Calophya terebinthifolii</i> Burckhardt & Basset, 2000 and <i>Calophya latiforceps</i> Burckhardt, 2011 against <i>Schinus terebinthifolia</i>). Similarly, <i>C. limbata</i> may be useful to control the Chinese parasol tree in the USA. Removal of large quantities of plant sap and production of wax masses and honeydew have a negative influence on the plant growth. Detailed biological studies are necessary to evaluate the impact of the psyllid on its host. As the Chinese parasol tree is still planted as ornamental in some parts of the USA, the use of <i>C. limbata</i> as its control agent has to be evaluated critically."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Broad climate suitability (temperate to subtropical)
- Capable of growing in subtropical climates
- Widely naturalized in southern USA
- Garden and landscape weed
- Environmental weed in southern US forests, excluding native vegetation
- Seedlings are shade tolerant
- Tolerates many soil types
- Reported to form dense stands in Louisiana
- Reproduces by seeds
- Self-compatible
- Rapid growth rate
- Seeds dispersed by wind, water & intentionally by people
- Tolerates cutting & heavy pruning

Low Risk Traits

- Native to regions with temperate to subtropical climates. May limit invasiveness to higher elevations of tropical islands
- Unarmed (no spines, thorns, or burrs)
- Palatable to browsing & grazing animals
- Non-toxic
- Ornamental
- Not reported to spread vegetatively
- Despite rapid growth rate, not reported to reach reproductive maturity for possibly 10+ years
- Herbicides may provide effective control