

Taxon: Celtis sinensis Pers.	Family: Cannabaceae
Common Name(s): Chinese hackberry Chinese nettletree Japanese hackberry	Synonym(s): Celtis japonica Planch. Celtis sinensis var. japonica (Planch.) Celtis tetrandra subsp. sinensis

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 29 Jan 2018
WRA Score: 12.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Tree, Environmental Weed, Shade-Tolerant, Dense Stands, 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)	Low
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		
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)	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		
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
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	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
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	y
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)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Hu, Shiu-ying. 2005. Food Plants of China. Chinese University Press, Hong Kong	"Ripe fruits, gathered by children, and eaten locally." [No evidence of domestication]
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	NA
103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	NA
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	Low
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 28 Jan 2018]	"Native Asia-Temperate China: China Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Jiangsu, Jiangxi, Shandong, Sichuan, Zhejiang Eastern Asia: Japan Honshu, Kyushu, Shikoku; Taiwan"
202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 28 Jan 2018]	
203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2003. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Roadsides, slopes; 100-1500 m." [Elevation range exceeds 1000 m, demonstrating environmental versatility]
	Gilman, E.F. & Watson, D.G. 1993, <i>Celtis sinensis</i> : Japanese Hackberry. Fact Sheet ST-142. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. http://hort.ifas.ufl.edu/ . [Accessed 29 Jan 2018]	"USDA hardiness zones: 5 through 9" [Grown in 5 hardiness zones]

Qsn #	Question	Answer
204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	NSW WeedWise. 2018. Chinese celtis (<i>Celtis sinensis</i>). http://weeds.dpi.nsw.gov.au/Weeds/Details/37 . [Accessed 29 Jan 2018]	"It is a major environmental weed in south-east Queensland, expanding rapidly over recent years into major infestations along riparian zones." ... "Current infestations are largely in riparian zones in areas originally supporting subtropical and dry rainforests."

Qsn #	Question	Answer
205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Panetta, F. D. (2001). Seedling emergence and seed longevity of the tree weeds <i>Celtis sinensis</i> and <i>Cinnamomum camphora</i> . <i>Weed Research</i> , 41(1), 83-95	" <i>Celtis sinensis</i> Pers. (Ulmaceae) (Chinese elm) is a semi-deciduous tree that grows to 10±15 m in height. It is native to eastern Asia (China, Korea and Japan), but has been introduced and widely cultivated as a garden plant/shade tree in south-eastern Queensland and northern New South Wales."
	Imada, C.T., Staples, G.W. & Herbst, D.R. 2005. Annotated Checklist of Cultivated Plants of Hawai'i. http://www2.bishopmuseum.org/HBS/botany/cultivatedplants/ . [Accessed 29 Jan 2018]	" <i>Celtis sinensis</i> Persoon Locations: Harold L. Lyon Arboretum"
	Little Jr., E.L. & Skolmen, R.G. 1989. Common forest trees of Hawaii: (native and introduced). USDA Agriculture Handbook No. 679. USDA Forest Service, Washington, D.C.	1 <i>Celtis sinensis</i> reported to have been planted in the Kula Forest Reserve, Maui in 1957

Qsn #	Question	Answer
301	Naturalized beyond native range	y
	Source(s)	Notes
	Panetta, F. D. (2001). Seedling emergence and seed longevity of the tree weeds <i>Celtis sinensis</i> and <i>Cinnamomum camphora</i> . <i>Weed Research</i> , 41(1), 83-95	" <i>Celtis sinensis</i> Pers. (Ulmaceae) (Chinese elm) is a semi-deciduous tree that grows to 10±15 m in height. It is native to eastern Asia (China, Korea and Japan), but has been introduced and widely cultivated as a garden plant/shade tree in south-eastern Queensland and northern New South Wales. <i>Celtis sinensis</i> has naturalized throughout much of this region over the past 80 years."
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 28 Jan 2018]	"Naturalized Africa Southern Africa: South Africa Australasia Australia: Australia Queensland New Zealand: New Zealand Northern America Southeastern U.S.A.: United States District of Columbia Southwestern U.S.A.: United States California"

Qsn #	Question	Answer
302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Gilman, E.F. & Watson, D.G. 1993, <i>Celtis sinensis</i> : Japanese Hackberry. Fact Sheet ST-142. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. http://hort.ifas.ufl.edu/ . [Accessed 29 Jan 2018]	"Roots: surface roots can lift sidewalks or interfere with mowing"

Qsn #	Question	Answer
	NSW WeedWise. 2018. Chinese celtis (<i>Celtis sinensis</i>). http://weeds.dpi.nsw.gov.au/Weeds/Details/37 . [Accessed 29 Jan 2018]	[Disturbance-adapted environmental weed. See 3.04] "It rapidly colonises disturbed bushland, forms dense thickets, replaces native shrubs and trees and dominates riparian vegetation."

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	y
	Source(s)	Notes
	Queensland Government. (2018). Weeds of Australia. <i>Celtis sinensis</i> . https://keyserver.lucidcentral.org . [Accessed 29 Jan 2018]	"Chinese celtis (<i>Celtis sinensis</i>) is a significant environmental weed in New South Wales and Queensland, and was recently listed as a priority environmental weed in two Natural Resource Management Regions. It is most common and widespread in south-eastern Queensland, where it is actively managed by community groups, and a recent assessment listed it as one of the top ten environmental weeds in this region."
	NSW WeedWise. 2018. Chinese celtis (<i>Celtis sinensis</i>). http://weeds.dpi.nsw.gov.au/Weeds/Details/37 . [Accessed 29 Jan 2018]	"Chinese celtis is a large, invasive tree that has become an environmental weed and a potential weed of agriculture because of its ability to become structurally dominant. It rapidly colonises disturbed bushland, forms dense thickets, replaces native shrubs and trees and dominates riparian vegetation. Chinese celtis has been recognised and listed as a serious environmental weed by bush regeneration groups, Councils and the National Parks and Wildlife Service. The demonstrated ability of Chinese celtis in south-east Queensland to spread rapidly makes its control in north-eastern NSW a high priority."
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"The tree has become invasive in New South Wales and Queensland, Australia, where it outcompetes native shrubs and trees by forming dense stands and preventing their regeneration. The tree forms dense infestations along creeks, disrupting the native vegetation and reducing habitat for wildlife. The tree quickly colonizes forest clearings and other disturbed areas (State of Queensland, 2014)."

305	Congeneric weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Dénes, B. & Csiszár, A. 2008. Common hackberry (<i>Celtis occidentalis</i> L.). Pp. 95-102 in Z. Botta-Dukát & L. Balogh (eds.). <i>The Most Important Invasive Plants in Hungary</i> . Institute of Ecology and Botany, Hungarian Academy of Sciences, Vácrátót, Hungary	"In Ujvárdy's (1997) opinion around Budapest the common hackberry is the most common adventive species after the Tree-of-Heaven and the boxelder. The spreading of the species can primarily be observed on sites, where it was planted as park tree, alley tree or with silvicultural purpose, and from here by birds' mediation it could easily settle down even on dry habitats, as it can be observed on the sand of the Kiskunság. The scale of its spreading on the floodplains for the time being is not so intense, as it is of the boxelder or of the desert false indigo, that is why the conservationist maintenance that concerns solely the common hackberry is not much common, moreover at many places they do not make anything against it because of the protected nettle-tree butterfly (<i>Libythea celtis</i>) that lives on the tree."
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	<i>Celtis australis</i> & <i>Celtis occidentalis</i> cited as naturalized and weeds in a number of references.

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2003. <i>Flora of China</i> . Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Trees, to 20 m tall, deciduous. Bark gray. Branchlets brown, brown pubescent, sometimes glabrescent late in season. Winter buds dark brown, 13 mm, glabrous or inconspicuously puberulent. Stipules linear to lanceolate, 35 mm, pubescent, fugacious. Petiole brown, 310 mm, pubescent, adaxially with a broad and shallow furrow; leaf blade ovate to ovate-elliptic, 3.10 × 3.56 cm, thickly papery, abaxially usually inconspicuously yellowish brown puberulent when young, abaxially with hairs scattered on major veins and sometimes tufted in vein axils with age, base rounded, obtuse, or obliquely truncate, ± symmetric to moderately oblique, margin subentire to crenate on apical half, teeth 16 on each side, apex acute to shortly acuminate; secondary veins 3 or 4 on each side of midvein."

402	Allelopathic	n
	Source(s)	Notes
	Appiah, K., Li, Z., Zeng, R. S., Luo, S., Oikawa, Y., & Fujii, Y. (2015). Determination of allelopathic potentials in plant species in Sino-Japanese floristic region by sandwich method and dish pack method. <i>International Journal of Basic and Applied Sciences</i> , 4(4), 381-394	[Not significant in this study] "Table 2: Determination of allelopathic activity by volatile compounds in some plant species in the Sino-Japanese Region using the dish pack method" [<i>Celtis sinensis</i> does NOT demonstrate stronger inhibitory activity of test sample on the radicle elongation of lettuce by standard deviation variance]

403	Parasitic	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2003. <i>Flora of China</i> . Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Trees, to 20 m tall, deciduous." [No evidence]

404	Unpalatable to grazing animals	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Tsuji, Y., Shimoda-Ishiguro, M., Ohnishi, N., & Takatsuki, S. (2007). A friend in need is a friend indeed: feeding association between Japanese macaques and sika deer. <i>Acta Theriologica</i> , 52(4), 427-434	"Appendix. Nutritional compositions (mean ± SD) of the gleaning foods and the non-gleaning foods of sika deer on Kinkazan island, northern Japan." [Celtis sinensis bark & leaves consumed]

405	Toxic to animals	n
	Source(s)	Notes
	Victorian Resources Online. 2018. Chinese celtis (<i>Celtis sinensis</i>). http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/weeds_chinese-celtis . [Accessed 29 Jan 2018]	"No thorns, burrs, spines (UNIF 2009) and no toxins reported. No effect. "
	Tsuji, Y., Shimoda-Ishiguro, M., Ohnishi, N., & Takatsuki, S. (2007). A friend in need is a friend indeed: feeding association between Japanese macaques and sika deer. <i>Acta Theriologica</i> , 52(4), 427-434	[No evidence] "Appendix. Nutritional compositions (mean ± SD) of the gleaning foods and the non-gleaning foods of sika deer on Kinkazan island, northern Japan." [Celtis sinensis bark & leaves consumed]
	Quattrocchi, U. 2012. <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	Yukawa, J., & Tsuda, K. (1987). A new gall midge (Diptera, Cecidomyiidae) causing conical leaf galls on <i>Celtis</i> (Ulmaceae) in Japan. <i>Kontyû</i> , 55(1), 123-131	"Abstract : A new species of cecidomyiid causing conical galls on the leaves and new twigs of <i>Celtis sinensis</i> var. <i>japonica</i> and <i>C. jessoensis</i> in Japan is described as <i>Celticis japonica</i> sp. n. Information is given on its food plants, gall, life-history, parasitoids (including <i>Torymus</i> sp. and <i>Eupelmus urozonus</i>) and geographical distribution. This species is univoltine, adults emerging in early spring from galls that fell to the ground the preceding year."
	Victorian Resources Online. 2018. Chinese celtis (<i>Celtis sinensis</i>). http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/weeds_chinese-celtis . [Accessed 29 Jan 2018]	"Long-term health usually not affected by pests (UNIF 2009). Celtis Leaf beetle (BBI 2009). Provides host to minor (or common) pests, or diseases."
	Gilman, E.F. & Watson, D.G. 1993, <i>Celtis sinensis</i> : Japanese Hackberry. Fact Sheet ST-142. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. http://hort.ifas.ufl.edu/ . [Accessed 28 Jan 2018]	"Pest resistance: long-term health usually not affected by pests" ... "No pests or diseases are of major concern. If this tree responds similarly to Common Hackberry, the trunk can rot following mechanical injury. Not seen with leaf gall which is so common on <i>Celtis occidentalis</i> ."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Hu, Shiu-ying. 2005. <i>Food Plants of China</i> . Chinese University Press, Hong Kong	"Ripe fruits, gathered by children, and eaten locally."

Qsn #	Question	Answer
	Green, B. J., & Dettmann, M. (2004). Quantitative trends in airborne loads of <i>Celtis sinensis</i> pollen and associations with meteorological variables in a subtropical Australian environment. <i>Annals of Agricultural and Environmental Medicine</i> , 11(2), 297-302	[Potential allergen] " <i>Celtis sinensis</i> is an introduced plant species to the southeastern region of Queensland that has had a destructive affect on indigenous plant communities and its pollen has been identified as an allergen source. Pollen belonging to <i>C. sinensis</i> was sampled during a 5-year (June 1994-May 1999) atmospheric pollen-monitoring programme in Brisbane, Australia, using a Burkard 7-day spore trap. The seasonal incidence of airborne <i>C. sinensis</i> pollen (CsP) in Brisbane occurred over a brief period each year during spring (August-September), while peak concentrations were restricted to the beginning of September."

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	Victorian Resources Online. 2018. Chinese celtis (<i>Celtis sinensis</i>). http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/weeds_chinese-celtis . [Accessed 29 Jan 2018]	"Change fire regime? Not enough information. "
	Weber, E. 2017. <i>Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	[Unknown. Formation of dense stands may increase fuel load] "The tree has become invasive in New South Wales and Queensland, Australia, where it outcompetes native shrubs and trees by forming dense stands and preventing their regeneration."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Weber, E. 2017. <i>Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	" <i>Celtis sinensis</i> is relatively shade tolerant (Panetts, 2001)."
	Panetta, F. D. (2001). Seedling emergence and seed longevity of the tree weeds <i>Celtis sinensis</i> and <i>Cinnamomum camphora</i> . <i>Weed Research</i> , 41(1), 83-95	"It also appears to be relatively shade-tolerant (Bhujju & Ohsawa, 1999) and often becomes the dominant species in riparian habitats (Csurhes & Edwards, 1998)."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	NSW WeedWise. 2018. Chinese celtis (<i>Celtis sinensis</i>). http://weeds.dpi.nsw.gov.au/Weeds/Details/37 . [Accessed 29 Jan 2018]	"Chinese celtis is reported to grow in a wide range of soils, preferring moist areas. Current infestations are largely in riparian zones in areas originally supporting subtropical and dry rainforests."
	Hu, Shiu-ying. 2005. <i>Food Plants of China</i> . Chinese University Press, Hong Kong	"Soil tolerances: clay; loam; sand; slightly alkaline; acidic; occasionally wet; well-drained"

Qsn #	Question	Answer
411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2003. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Trees, to 20 m tall, deciduous."
412	Forms dense thickets	y
	Source(s)	Notes
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"The tree has become invasive in New South Wales and Queensland, Australia, where it outcompetes native shrubs and trees by forming dense stands and preventing their regeneration. The tree forms dense infestations along creeks, disrupting the native vegetation and reducing habitat for wildlife. The tree quickly colonizes forest clearings and other disturbed areas (State of Queensland, 2014)."
501	Aquatic	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2003. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Terrestrial] "Trees, to 20 m tall, deciduous." ... "Roadsides, slopes; 100-1500 m."
502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 28 Jan 2018]	Family: Cannabaceae Altfamily: Celtidaceae
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2003. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	Ulmaceae
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 28 Jan 2018]	Family: Cannabaceae Altfamily: Celtidaceae
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n

Qsn #	Question	Answer
	Source(s)	Notes
	<p>Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2003. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis</p>	<p>"Trees, to 20 m tall, deciduous. Bark gray. Branchlets brown, brown pubescent, sometimes glabrescent late in season. Winter buds dark brown, 13 mm, glabrous or inconspicuously puberulent. Stipules linear to lanceolate, 35 mm, pubescent, fugacious. Petiole brown, 310 mm, pubescent, adaxially with a broad and shallow furrow; leaf blade ovate to ovate-elliptic, 3.10 × 3.56 cm, thickly papery, abaxially usually inconspicuously yellowish brown puberulent when young, abaxially with hairs scattered on major veins and sometimes tufted in vein axils with age, base rounded, obtuse, or obliquely truncate, ± symmetric to moderately oblique, margin subentire to crenate on apical half, teeth 0.16 on each side, apex acute to shortly acuminate; secondary veins 3 or 4 on each side of midvein. Flowers fascicled in leaf axils and stem bases. Style branches linear, undivided. Infructescences unbranched, 1(3) per leaf axil, rather stout, pubescent at least proximally, 410 mm; fruiting pedicel 11.5 × as long as subtending petiole. Drupe ± globose, 57(8) mm in diam. Stone white, ± globose, reticulately foveolate, ribbed."</p>

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	<p>USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed]</p>	<p>[No evidence. Broad native distribution] "Native Asia-Temperate China: China Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Jiangsu, Jiangxi, Shandong, Sichuan, Zhejiang Eastern Asia: Japan Honshu, Kyushu, Shikoku; Taiwan"</p>

602	Produces viable seed	y
	Source(s)	Notes
	<p>Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK</p>	<p>"its seeds are dispersed by birds, fruit bats and in its introduced Australian range also by flying foxes, and can be carried by water streams" ... "Seeds are short-lived and are viable for c. 24 months (Panetta, 2001)."</p>
	<p>Gilman, E.F. & Watson, D.G. 1993, <i>Celtis sinensis</i>: Japanese Hackberry. Fact Sheet ST-142. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. http://hort.ifas.ufl.edu/. [Accessed 28 Jan 2018]</p>	<p>"Propagation is by seed or cuttings."</p>

Qsn #	Question	Answer
	Yoshikawa, T., & Isagi, Y. (2014). Negative effect of removing pulp from unripe fleshy fruits: seed germination pattern of <i>Celtis sinensis</i> in relation to the temporal context of fruit consumption. <i>Journal of Forest Research</i> , 19(4), 411-416	"We explored the temporal effects of fruit consumption on the subsequent seed germination pattern of a fleshy-fruited tree, the Chinese hackberry (<i>Celtis sinensis</i>). Via nursery-based sowing experiments, we investigated (1) how pulp removal affected seed germination patterns at the different stages of fruit maturation, and (2) how the timing of seed dispersal (August, October, and December) affected the germination patterns of seeds from ripe fruits after the removal of pulp. We found that the removal of pulp from around the seeds of ripe fruit had no effect on the percentage and timing of germination. In contrast, the removal of pulp from seeds of unripe fruits largely reduced the germination percentage. The time of sowing did not affect the germination percentage, whereas the timing of germination was delayed for seeds that were sown later or under shaded environments."

603	Hybridizes naturally	
	Source(s)	Notes
	Whittemore, A. T., & Townsend, A. M. (2007). Hybridization and self-compatibility in <i>Celtis</i> : AFLP analysis of controlled crosses. <i>Journal of the American Society for Horticultural Science</i> , 132(3), 368-373	[Potentially Yes] "Artificial cross-pollinations were carried out among seven species of <i>Celtis</i> L. (<i>C. bungeana</i> Blume, <i>C. koraiensis</i> Nakai, <i>C. laevigata</i> Willd., <i>C. occidentalis</i> L., <i>C. reticulata</i> Torr., <i>C. sinensis</i> Pers., and <i>C. tenuifolia</i> Nutt.) to test the potential for interspecific hybridization in <i>Celtis</i> breeding. AFLP profiles were used to assess the ancestry of progeny. Hybrids formed very rarely among these seven species of <i>Celtis</i> : only two interspecific hybrids were obtained." ... "Pollination of <i>C. sinensis</i> NA55093.002 with <i>C. koraiensis</i> NA60281 yielded three progeny."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Whittemore, A. T., & Townsend, A. M. (2007). Hybridization and self-compatibility in <i>Celtis</i> : AFLP analysis of controlled crosses. <i>Journal of the American Society for Horticultural Science</i> , 132(3), 368-373	"Self-pollination occurred occasionally in non-emasculated trees." ... "More than half of the pollination experiments yielded progeny but usually in small numbers. All but one of the pollination experiments yielded <10 progeny. Progeny were obtained from both self-pollinations and outcrosses." ... "In addition, there is some evidence that at least some species of <i>Celtis</i> are capable of apomixis, so some of the seeds listed as selfs could actually be apomicts."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Kubitzki, K., Rohwer, J.G. & Bittrich, V. (eds.). 1993. <i>The Families and Genera of Vascular Plants: Volume II. Flowering Plants. Dicotyledons: Magnoliid, Hamamelid and Caryophyllid Families.</i> Springer-Verlag, Berlin, Heidelberg, New York	"The structure of the flowers and inflorescences in the Ulmaceae, the quantity of pollen produced, the structure of the stigma, and the absence of nectar all suggest wind pollination. <i>Celtis iguanaea</i> in southeastern Brazil was determined to be anemophilous because of its large number of male (versus hermaphroditic) flowers, its xenogamous reproductive system and its flowering period being in the windiest part of the year (Arruda and Sazima 1988). In Malesia wind and insects have been suggested as the pollinating agents of <i>Trema</i> and <i>Celtis</i> based on flower and inflorescence structure (Soepadmo 1977)."

Qsn #	Question	Answer
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2003. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Generic description] "Inflorescences panicles, racemes, or clustered cymelets. Flowers small, unisexual or bisexual. Tepals 4 or 5, basally slightly connate, caducous. Stamens equal in number to tepals. Style short; stigmas 2, linear. Ovary unilocular; ovule 1, anatropous. Male flowers: cauliflorous or clustered in proximal leaf axil of one year-old branchlets. Female and bisexual flowers: usually borne apically in polygamous inflorescences."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"The tree produces suckers"
	Queensland Government. (2018). Weeds of Australia. <i>Celtis sinensis</i> . https://keyserver.lucidcentral.org . [Accessed 29 Jan 2018]	"This plant reproduces mostly by seeds, but also produces suckers. "

607	Minimum generative time (years)	
	Source(s)	Notes
	Victorian Resources Online. 2018. Chinese celtis (<i>Celtis sinensis</i>). http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/weeds_chinese-celtis . [Accessed 29 Jan 2018]	"Time to reproductive maturity? Not enough information"
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Tree up to 20 m in height ... In the native range, this fast-growing tree grows mostly in open sites such as forest edges..." [Time to maturity unknown]

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Queensland Government. (2018). Weeds of Australia. <i>Celtis sinensis</i> . https://keyserver.lucidcentral.org . [Accessed 29 Jan 2018]	"Its seeds are usually dispersed by animals (e.g. birds and flying foxes), by water movement, or in dumped garden waste."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Panetta, F. D. (2001). Seedling emergence and seed longevity of the tree weeds <i>Celtis sinensis</i> and <i>Cinnamomum camphora</i> . <i>Weed Research</i> , 41(1), 83-95	" <i>Celtis sinensis</i> Pers. (Ulmaceae) (Chinese elm) is a semi-deciduous tree that grows to 10±15 m in height. It is native to eastern Asia (China, Korea and Japan), but has been introduced and widely cultivated as a garden plant/shade tree in south-eastern Queensland and northern New South Wales."
	NSW WeedWise. 2018. Chinese celtis (<i>Celtis sinensis</i>). http://weeds.dpi.nsw.gov.au/Weeds/Details/37 . [Accessed 29 Jan 2018]	"Chinese celtis has also been promoted and planted as a shade and street tree, which has assisted in its spread over the years. "

703	Propagules likely to disperse as a produce contaminant	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Yoshikawa, T., & Isagi, Y. (2014). Negative effect of removing pulp from unripe fleshy fruits: seed germination pattern of <i>Celtis sinensis</i> in relation to the temporal context of fruit consumption. <i>Journal of Forest Research</i> , 19(4), 411-416	" <i>Celtis sinensis</i> belongs to the family Cannabaceae, and it is a deciduous, tall tree (reaching heights of 20–30 m) that depends on frugivorous birds and mammals for seed dispersal (Koike and Masaki 2008; Yoshikawa et al. 2009)."

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Yoshikawa, T., & Isagi, Y. (2014). Negative effect of removing pulp from unripe fleshy fruits: seed germination pattern of <i>Celtis sinensis</i> in relation to the temporal context of fruit consumption. <i>Journal of Forest Research</i> , 19(4), 411-416	" <i>Celtis sinensis</i> belongs to the family Cannabaceae, and it is a deciduous, tall tree (reaching heights of 20–30 m) that depends on frugivorous birds and mammals for seed dispersal (Koike and Masaki 2008; Yoshikawa et al. 2009)." ... The tree bears round, fleshy fruits (orange-red in color), that each contain a single seed."

705	Propagules water dispersed	y
	Source(s)	Notes
	Weber, E. 2017. <i>Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	"its seeds are dispersed by birds, fruit bats and in its introduced Australian range also by flying foxes, and can be carried by water streams (Panetta, 2001; State of Queensland, 2014)."

706	Propagules bird dispersed	y
	Source(s)	Notes
	Yoshikawa, T., & Isagi, Y. (2014). Negative effect of removing pulp from unripe fleshy fruits: seed germination pattern of <i>Celtis sinensis</i> in relation to the temporal context of fruit consumption. <i>Journal of Forest Research</i> , 19(4), 411-416	" <i>Celtis sinensis</i> belongs to the family Cannabaceae, and it is a deciduous, tall tree (reaching heights of 20–30 m) that depends on frugivorous birds and mammals for seed dispersal (Koike and Masaki 2008; Yoshikawa et al. 2009)." ... The tree bears round, fleshy fruits (orange-red in color), that each contain a single seed. At the study site, the fleshy fruits of this plant are consumed throughout the fruiting period (Yoshikawa et al. 2012) by several avian seed dispersers, specifically, the brown-eared bulbul (<i>Hypsipetes amaurotis</i>), the Japanese white-eye (<i>Zosterops japonicus</i>), the dusky thrush (<i>Turdus naumanni</i>), the jungle crow (<i>Corvus macrorhynchos</i>), and the carrion crow (<i>Corvus corone</i>). Frugivorous birds, especially crows, also regularly feed on and excrete the seeds of unripe, green fruits during the early fruiting period (T. Yoshikawa, personal observation)."
	NSW WeedWise. 2018. Chinese celtis (<i>Celtis sinensis</i>). http://weeds.dpi.nsw.gov.au/Weeds/Details/37 . [Accessed 29 Jan 2018]	"Chinese celtis seeds are spread by birds feeding on its fruit in autumn and early winter. This enhances the dispersal of Chinese celtis throughout the disturbed, regenerating riparian zones."
	Weber, E. 2017. <i>Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	"its seeds are dispersed by birds, fruit bats and in its introduced Australian range also by flying foxes, and can be carried by water streams (Panetta, 2001; State of Queensland, 2014)."

Qsn #	Question	Answer
	Yoshikawa, T., Masaki, T., Isagi, Y., & Kikuzawa, K. (2012). Interspecific and annual variation in pre-dispersal seed predation by a granivorous bird in two East Asian hackberries, <i>Celtis biondii</i> and <i>Celtis sinensis</i> . <i>Plant Biology</i> , 14(3), 506-514	"Within the study site, the two hackberry species have similar assemblages of avian seed dispersers: brown-eared bulbul (<i>Hypsipetes amaurotis</i>), Japanese white-eye (<i>Zosterops japonicus</i>) and dusky thrush (<i>Turdus naumani</i>). Jungle crow (<i>Corvus macrorhynchos</i>) and carrion crow (<i>Corvus corone</i>) were observed to feed on <i>C. sinensis</i> fruits but not on those of <i>C. biondii</i> (T. Yoshikawa, personal observations)."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Yoshikawa, T., & Isagi, Y. (2014). Negative effect of removing pulp from unripe fleshy fruits: seed germination pattern of <i>Celtis sinensis</i> in relation to the temporal context of fruit consumption. <i>Journal of Forest Research</i> , 19(4), 411-416	[Primarily dispersed internally by birds and mammals] " <i>Celtis sinensis</i> belongs to the family Cannabaceae, and it is a deciduous, tall tree (reaching heights of 20–30 m) that depends on frugivorous birds and mammals for seed dispersal (Koike and Masaki 2008; Yoshikawa et al. 2009)." ... "At the study site, the fleshy fruits of this plant are consumed throughout the fruiting period (Yoshikawa et al. 2012) by several avian seed dispersers, specifically, the brown-eared bulbul (<i>Hypsipetes amaurotis</i>), the Japanese white-eye (<i>Zosterops japonicus</i>), the dusky thrush (<i>Turdus naumanni</i>), the jungle crow (<i>Corvus macrorhynchos</i>), and the carrion crow (<i>Corvus corone</i>). Frugivorous birds, especially crows, also regularly feed on and excrete the seeds of unripe, green fruits during the early fruiting period (T. Yoshikawa, personal observation)."

708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Yoshikawa, T., & Isagi, Y. (2014). Negative effect of removing pulp from unripe fleshy fruits: seed germination pattern of <i>Celtis sinensis</i> in relation to the temporal context of fruit consumption. <i>Journal of Forest Research</i> , 19(4), 411-416	" <i>Celtis sinensis</i> belongs to the family Cannabaceae, and it is a deciduous, tall tree (reaching heights of 20–30 m) that depends on frugivorous birds and mammals for seed dispersal (Koike and Masaki 2008; Yoshikawa et al. 2009)." ... The tree bears round, fleshy fruits (orange-red in color), that each contain a single seed. At the study site, the fleshy fruits of this plant are consumed throughout the fruiting period (Yoshikawa et al. 2012) by several avian seed dispersers, specifically, the brown-eared bulbul (<i>Hypsipetes amaurotis</i>), the Japanese white eye (<i>Zosterops japonicus</i>), the dusky thrush (<i>Turdus naumanni</i>), the jungle crow (<i>Corvus macrorhynchos</i>), and the carrion crow (<i>Corvus corone</i>). Frugivorous birds, especially crows, also regularly feed on and excrete the seeds of unripe, green fruits during the early fruiting period (T. Yoshikawa, personal observation)."
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"It flowers in spring and produces thousands of small, orange berries that are dispersed by birds (fruit bats, brush-tail possums and ringtail possums have been observed to visit fruiting specimens in Brisbane and may also disperse seed)."
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"its seeds are dispersed by birds, fruit bats and in its introduced Australian range also by flying foxes, and can be carried by water streams (Panetta, 2001; State of Queensland, 2014)."

801	Prolific seed production (>1000/m2)	

Qsn #	Question	Answer
	Source(s)	Notes
	Panetta, F. D. (2001). Seedling emergence and seed longevity of the tree weeds <i>Celtis sinensis</i> and <i>Cinnamomum camphora</i> . <i>Weed Research</i> , 41(1), 83-95	" <i>Celtis sinensis</i> fruits prolifically on an annual basis, producing masses of spherical fruits containing seeds (4 mm diameter) that are dispersed primarily by birds (Csurhes & Edwards, 1998) and fruit bats (F D Panetta, pers. obs.)."
	NSW WeedWise. 2018. Chinese celtis (<i>Celtis sinensis</i>). http://weeds.dpi.nsw.gov.au/Weeds/Details/37 . [Accessed 29 Jan 2018]	[Possibly Yes. Densities unspecified] "Chinese celtis produces thousands of fleshy fruits that are approximately 7–8 mm in diameter. The fruits turn reddish brown to orange when ripe in autumn and early winter. Chinese celtis fruits during the same period as camphor laurel and similar birds feed on both species."

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	Notes
	Panetta, F. D. (2001). Seedling emergence and seed longevity of the tree weeds <i>Celtis sinensis</i> and <i>Cinnamomum camphora</i> . <i>Weed Research</i> , 41(1), 83-95	"Seeds of both species were relatively short-lived under field conditions. A maximum of 1% of seeds of <i>C. camphora</i> remained viable at 12 months post-sowing under field conditions, whereas a maximum of 8% viable seeds of <i>C. sinensis</i> was detected at 24 months post-sowing in one of the field experiments."
	Weber, E. 2017. <i>Invasive Plant Species of the World</i> , 2nd Edition: A Reference Guide to Environmental Weeds. CAB International, Wallingford, UK	[Seeds persist for >1 year] "Seeds are short-lived and are viable for c. 24 months (Panetta, 2001)."

803	Well controlled by herbicides	y
	Source(s)	Notes
	NSW WeedWise. 2018. Chinese celtis (<i>Celtis sinensis</i>). http://weeds.dpi.nsw.gov.au/Weeds/Details/37 . [Accessed 29 Jan 2018]	"Herbicide control is effective using the cut stump, basal bark or stem injection techniques. The method used depends on the site situation, tree size, access and personal preferences. Currently in NSW there are a number of registered herbicides and an AVPMA permit covering the use of herbicides for Chinese celtis control."
	Weber, E. 2017. <i>Invasive Plant Species of the World</i> , 2nd Edition: A Reference Guide to Environmental Weeds. CAB International, Wallingford, UK	"No specific control methods are available for this species. Methods used for other tree species may work. Seedlings and saplings can be pulled or dug out, larger trees cut and the cut stumps treated with herbicide."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	NSW WeedWise. 2018. Chinese celtis (<i>Celtis sinensis</i>). http://weeds.dpi.nsw.gov.au/Weeds/Details/37 . [Accessed 29 Jan 2018]	"Glyphosate 360 g/L (Roundup®) Rate: 1 part glyphosate to 50 parts water Comments: Spray seedlings and coppice shoots."
	Gilman, E.F. & Watson, D.G. 1993, <i>Celtis sinensis</i> : Japanese Hackberry. Fact Sheet ST-142. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. http://hort.ifas.ufl.edu/ . [Accessed 28 Jan 2018]	"Skilled pruning is required several times during the first 15 years of life to prevent formation of weak branch crotches and multiple trunks. It could be used in street plantings where there is plenty of soil space since it tolerates most soils and grows in sun or partial shade, but branches may break out from the trunk if proper pruning and training is not conducted early in the life of the tree."

Qsn #	Question	Answer
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Able to grow in regions with subtropical climates
- Naturalized in Australia, South Africa & parts of North America
- Disturbance-adapted environmental weed (excludes native vegetation)
- Other *Celtis* species have become invasive
- Pollen may be allergenic
- Shade tolerant
- Tolerates many soil types
- Forms dense stands that exclude other vegetation
- Reproduces by seeds and vegetatively by suckers
- May hybridize with other *Celtis* species
- Some self-compatibility documented
- Seeds dispersed by birds, mammals, water & intentionally by people
- Some seeds may persist for up to 24 months
- Able to resprout after cutting

Low Risk Traits

- Invasiveness may be limited to higher elevation regions in the tropics & subtropics
- Unarmed (no spines, thorns, or burrs)
- Palatable to browsing animals
- Ornamental
- Fruit edible to people
- Herbicides may provide effective control