

Family: *Ulmaceae*

Taxon: *Ulmus parvifolia*

Synonym: *Ulmus sieboldii* Daveau

Common Name: Chinese elm
lacebark elm

Questionnaire : current 20090513
Status: Assessor Approved

Assessor: Patti Clifford
Data Entry Person: Patti Clifford

Designation: H(HPWRA)

WRA Score 12

101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?	y=1, n=-1	
103	Does the species have weedy races?	y=1, n=-1	
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)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	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	y=1, n=0	
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens	y=1, n=0	n
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
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	
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	y=1, n=-1	y
604	Self-compatible or apomictic	y=1, n=-1	
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	
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	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	
801	Prolific seed production (>1000/m2)	y=1, n=-1	
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	
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	

Designation: H(HPWRA)

WRA Score 12

Supporting Data:

101	2011. WRA Specialist. Personal Communication.	[Is the species highly domesticated? No] No evidence of domestication that reduces invasive potential.
102	2011. WRA Specialist. Personal Communication.	[Has the species become naturalized where grown?] NA
103	2011. WRA Specialist. Personal Communication.	[Does the species have weedy races?] NA
201	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical? Intermediate] Native range: China - Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang; Japan - Honshu, Kyushu, Ryukyu Islands; Korea, North; Taiwan; Vietnam
202	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Quality of climate match data? High] Native range: China - Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang; Japan - Honshu, Kyushu, Ryukyu Islands; Korea, North; Taiwan; Vietnam
203	2004. Fu, L./Xin, Y./Whittemore, A.. Flora of China - Ulmaceae. eFloras.org. http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=10928	[Broad climate suitability (environmental versatility)?] Below 800 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Zhejiang [India, Japan, N Korea, Vietnam]
203	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Broad climate suitability (environmental versatility)? Yes] Climatic amplitude (estimates) - Altitude range: 0 - 1000 m - Mean annual rainfall: 800 - 1050 mm - Rainfall regime: summer - Dry season duration: > 2 months - Mean annual temperature: 15 - 16°C - Mean maximum temperature of hottest month: 24 - 32°C - Mean minimum temperature of coldest month: -13 - -2°C - Absolute minimum temperature: > -35°C
203	2011. Daves' Garden. PlantFiles - Chinese elm, lacebark elm - <i>Ulmus parvifolia</i> . Dave's Garden, http://davesgarden.com/guides/pf/go/173/	[Broad climate suitability (environmental versatility)? Yes] Hardiness: USDA Zone 5a: to -28.8 °C (-20 °F) USDA Zone 5b: to -26.1 °C (-15 °F) USDA Zone 6a: to -23.3 °C (-10 °F) USDA Zone 6b: to -20.5 °C (-5 °F) USDA Zone 7a: to -17.7 °C (0 °F) 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)
203	2011. USDA Forest Service. Weed of the week - <i>Ulmus parvifolia</i> . U.S> Forest Service, Newton Square http://na.fs.fed.us/fhp/invasive_plants/weeds/chinese-elm.pdf	[Broad climate suitability (environmental versatility)? Yes] "Generally hardy from zones 5 to 8 but can tolerate zones 4-9."
204	2011. USDA Forest Service. Weed of the week - <i>Ulmus parvifolia</i> . U.S> Forest Service, Newton Square http://na.fs.fed.us/fhp/invasive_plants/weeds/chinese-elm.pdf	[Native or naturalized in regions with tropical or subtropical climates? Yes] Native range: China - Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang; Japan - Honshu, Kyushu, Ryukyu Islands; Korea, North; Taiwan; Vietnam
205	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Does the species have a history of repeated introductions outside its natural range? Yes] Planted extensively in the United States.
205	2007. Ghelardini, L.. Bud burst phenology, dormancy release and susceptibility to Dutch elm disease in elms (<i>Ulmus</i> spp.). http://pub.epsilon.slu.se/16711/1/978-91-85913-33-6.pdf	[Does the species have a history of repeated introductions outside its natural range? Yes] <i>Ulmus parvifolia</i> is not susceptible to Dutch elm disease and it is today the most ubiquitous elm species, being successfully introduced in Europe, Northern America, Southern Africa and New Zealand.

301	2008. California Invasive Pest Council. Ornamental plants invasive in other Mediterranean regions. California Invasive Pest Council, http://www.cal-ipc.org/ip/research/pdf/InvasiveMediterraneanOrnamentals.pdf	[Naturalized beyond native range? Yes] <i>Ulmus parvifolia</i> is naturalized in California.
302	2011. WRA Specialist. Personal Communication.	[Garden/amenity/disturbance weed? No] Scored as an environmental weed.
303	2007. Randall, R.. Global compendium of weeds - <i>Ulmus parvifolia</i> . Hawaii Ecosystems at Risk (HEAR), http://www.hear.org/gcw/species/ulmus_parvifolia/	[Agricultural/forestry/horticultural weed? No] No evidence.
304	2011. San Diego Chapter of the American Society of the Landscape Architects and San Diego Chapter of the California Native Plant Society. San Diego County invasive ornamental plant guide. http://www.asla-sandiego.org/Download/PG_08_mod.pdf	[Environmental weed? Yes] <i>Ulmus parvifolia</i> exhibits moderately invasive qualities within San Diego County open spaces. Its root systems are aggressive and close to the surface. The tree also produces an abundance of seeds. Invades wetlands and riparian areas, such as stream banks and drainage swales, or any area that retains moisture from rain or irrigation.
304	2011. USDA Forest Service. Weed of the week - <i>Ulmus parvifolia</i> . U.S> Forest Service, Newton Square http://na.fs.fed.us/fhp/invasive_plants/weeds/chinese-elm.pdf	[Environmental weed? Yes] "Ecological Impacts: It is an ornamental tree in urban areas planted for tough durability, interesting bark and yellowish to reddish purple fall foliage as well as being resistant to Dutch elm disease and air pollution. It has escaped intended plantings to invade native plant communities. The aggressive root system absorbs water, nutrient, and space" (in the United States).
305	2006. Texas Invasive.org. Invasives database - <i>Ulmus pumila</i> . Texasinvasives.org, http://www.texasinvasives.org/plant_database/detail.php?symbol=ULPU	[Congeneric weed? Yes] "Dry to mesic prairies and stream banks are vulnerable to Siberian elm invasion. Thickets of seedlings soon form around seed-producing trees, bare ground areas, animal and insect mounds, and other disturbed areas. Wind carries seed to distant areas where new colonies can form. This tough exotic survives under conditions not easily tolerated by other species, allowing it to take advantage of open ground and resources otherwise used by native plants. Fast growing seedlings of Siberian elm quickly overtake native vegetation, especially shade-intolerant species. This often leads to invasion by additional weedy species, compounding the problem."
305	2011. Wisconsin Department of Natural Resources. Siberian elm (<i>Ulmus pumila</i>). Wisconsin Department of Natural Resources, http://dnr.wi.gov/invasives/fact/elm.htm	[Congeneric weed? Yes] <i>Ulmus pumila</i> "tolerates a variety of conditions such as poor soils and low moisture, it is found in dry regions, along roadsides, and in pastures and grasslands. The tree also grows in moist soils along streams. It invades dry and mesic prairies, including sand prairies. It is now established from Minnesota south to Arkansas and west to Utah. This tree flowers in spring before leaves begin to unfold. The fruits develop quickly and are disseminated by wind, allowing the species to form thickets of hundreds of seedlings in bare ground. Seeds germinate readily and seedlings grow rapidly."
401	2004. Fu, L./Xin, Y./Whittemore, A.. Flora of China - Ulmaceae. eFloras.org, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=10928	[Produces spines, thorns or burrs? No] "Trees, to 25 m tall, d.b.h. to 100 cm, deciduous. Crown broadly orbicular. Bark gray to grayish brown, ± smooth, exfoliating into irregular scale-like flakes. Branchlets dark brown, densely pubescent when young, never winged. Winter buds reddish brown, ovoid-orbicular, glabrous. Petiole 2-6 mm, pubescent; leaf blade lanceolate-ovate to narrowly elliptic, lamina on two sides of midvein unequal in length and width, 2.5-5 × 1-2 cm, thick, abaxially pea green and pubescent when young, adaxially dark green, lustrous, and pubescent only on midvein, base oblique, margin obtusely and irregularly simply serrate, apex acute to obtuse; midvein depressed; secondary veins 10-15 on each side of midvein. Inflorescences fascicled cymes, 3-6-flowered. Pedicel very short, pubescent."
402	2011. WRA Specialist. Personal Communication.	[Allelopathic?] Unknown.
403	2004. Fu, L./Xin, Y./Whittemore, A.. Flora of China - Ulmaceae. eFloras.org, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=10928	[Parasitic? No] Ulmaceae.
404	2011. Ohio Landscape Association. Plant recommendations for special conditions - plants deer eat less often. Ohio Landscape Association, http://www.myohiolandscape.com/deer-resistant-plants.cfm	[Unpalatable to grazing animals?] Deer resistant.
405	2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	[Toxic to animals? No] No evidence.

405	2011. National Center for Biotechnology Information. PubMed. U.S. National Library of Medicine, Bethesda, Maryland http://www.ncbi.nlm.nih.gov/	[Toxic to animals? No] No evidence.
405	2011. Specialized Information Services, U.S. National Library of Medicine. TOXNET toxicology data network [online database]. National Institutes of Health, http://toxnet.nlm.nih.gov/	[Toxic to animals? No] No evidence.
406	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Host for recognized pests and pathogens? No] Pests recorded Insects: Paleacrita vernata (spring cankerworm) Pyrrhalta luteola (elm leaf beetle) Nematodes: Helicotylenchus dihystra (common spiral nematode) Fungus diseases: Gnomonia ulmea Phytoplasmas: elm yellows
407	2011. National Center for Biotechnology Information. PubMed. U.S. National Library of Medicine, Bethesda, Maryland http://www.ncbi.nlm.nih.gov/	[Causes allergies or is otherwise toxic to humans?] No evidence.
407	2011. Pollen Library. Ulmus parvifolia. SDI Health LLC, http://www.pollenlibrary.com/Specie/Ulmus+parvifolia/	[Causes allergies or is otherwise toxic to humans?] The pollen library states that Ulmus parvifolia's pollen causes moderate allergies.
407	2011. Specialized Information Services, U.S. National Library of Medicine. TOXNET toxicology data network [online database]. National Institutes of Health, http://toxnet.nlm.nih.gov/	[Causes allergies or is otherwise toxic to humans?] No evidence.
408	2011. WRA Specialist. Personal Communication.	[Creates a fire hazard in natural ecosystems? No] No evidence of biomass accumulation.
409	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Is a shade tolerant plant at some stage of its life cycle? Yes] Tolerates shade.
409	2011. Daves' Garden. PlantFiles - Chinese elm, lacebark elm - Ulmus parvifolia. Dave's Garden, http://davesgarden.com/guides/pf/go/173/	[Is a shade tolerant plant at some stage of its life cycle? Yes] Full sun, sun to partial shade.
410	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes] Soil descriptors - Soil texture: medium - Soil drainage: free - Soil reaction: acid; neutral
410	2011. San Diego Chapter of the American Society of the Landscape Architects and San Diego Chapter of the California Native Plant Society. San Diego County invasive ornamental plant guide. http://www.asla-sandiego.org/Download/PG_08_mod.pdf	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes] Adaptable to virtually any soil type.
411	2004. Fu, L./Xin, Y./Whittemore, A.. Flora of China - Ulmaceae. eFloras.org, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=10928	[Climbing or smothering growth habit? No] Trees to 25 m tall.
412	2011. WRA Specialist. Personal Communication.	[Forms dense thickets?] Unknown.
501	2004. Fu, L./Xin, Y./Whittemore, A.. Flora of China - Ulmaceae. eFloras.org, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=10928	[Aquatic? No] Terrestrial; tree.
502	2004. Fu, L./Xin, Y./Whittemore, A.. Flora of China - Ulmaceae. eFloras.org, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=10928	[Grass? No] Ulmaceae.
503	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Nitrogen-fixing woody plant? No] Ulmaceae.

504	2004. Fu, L./Xin, Y./Whittemore, A.. Flora of China - Ulmaceae. eFloras.org, http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=10928	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] Tree.
601	2011. WRA Specialist. Personal Communication.	[Evidence of substantial reproductive failure in native habitat?] No evidence.
602	2010. Nomiya, H.. Differentiation of seed germination traits in relation to the natural habitats of three <i>Ulmus</i> species in Japan. <i>Journal of Forest Research</i> . 15: 123-130.	[Produces viable seed? Yes] "The autumn-fruiting <i>Ulmus parvifolia</i> , distributed in warm-temperate regions, showed the highest proportion of primary dormancy among the three <i>Ulmus</i> species. Notably, <i>Ulmus parvifolia</i> showed no increase in germination rate under good light conditions in comparison with dark conditions. For higher seedling survival, it is advantageous to be strictly dormant during seed dissemination, considering the inevitable warm climate during the seed dissemination season and the remaining short growing period. Seed dormancy of <i>Ulmus parvifolia</i> seeds can be broken easily by a sufficient chilling period in winter, and <i>Ulmus parvifolia</i> seeds germinate immediately when the temperature becomes high enough in the following spring. Only portion of the seeds buried in the soil under dark and stable temperature conditions will be maintained as a seed bank. Higa et al. (2006) suggested that the seeds of <i>Ulmus parvifolia</i> , even under the dry chilling period, can maintain their germination ability, and this seed trait contributes to the regeneration of <i>Ulmus parvifolia</i> on the hot and dry gravel zone along the river."
602	2011. Barbour, J.R./Brinkman, K.A.. <i>Ulmus L.</i> - elm. U.S. Forest Service, http://www.nsl.fs.fed.us/wpsm/Ulmus.pdf	[Produces viable seed? Yes] Seed stored at 0 degrees Celsius have a viability of 1/2 year.
603	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Hybridizes naturally? Yes] "This species occurs along the eastern seaboard of Asia, between the island of Honshu (Japan) in the North and the Hainan Island (China) in the South. There, its distribution area coincides with that of the subtropical <i>Ulmus lanceifolia</i> , from which it may have evolved: the two species have similarities in their leathery leaves and in the shape of their flowers. Seemingly intermediate forms have been found on the island of Hainan."
604	2011. WRA Specialist. Personal Communication.	[Self-compatible or apomictic?] Unknown.
605	2011. Plants for a Future. <i>Ulmus parvifolia</i> [online database]. Plants for a Future, http://www.pfaf.org/user/Plant.aspx?LatinName=Ulmus%20parvifolia	[Requires specialist pollinators? No] The flowers are hermaphrodite (have both male and female organs) and are pollinated by Wind.
605	2011. Pollen Library. <i>Ulmus parvifolia</i> . SDI Health LLC, http://www.pollenlibrary.com/Specie/Ulmus+parvifolia/	[Requires specialist pollinators? No] Wind pollinated.
606	2011. Daves' Garden. PlantFiles - Chinese elm, lacebark elm - <i>Ulmus parvifolia</i> . Dave's Garden, http://davesgarden.com/guides/pf/go/173/	[Reproduction by vegetative fragmentation?] Propagate by seed. "This is a highly invasive tree that sends out runners and sprouts. My neighbor had one in his yard and cut it down. In my yard I still have many sprouts growing that came up from his tree, despite my active and laborious removal of them. The sprouts quickly grow into trees. Be warned!"
606	2011. Plants for a Future. <i>Ulmus parvifolia</i> [online database]. Plants for a Future, http://www.pfaf.org/user/Plant.aspx?LatinName=Ulmus%20parvifolia	[Reproduction by vegetative fragmentation? Yes] Propagate by seed, layered cutting or coppicing.
607	2011. USDA Forest Service. Weed of the week - <i>Ulmus parvifolia</i> . U.S. Forest Service, Newton Square http://na.fs.fed.us/fhp/invasive_plants/weeds/chinese-elm.pdf	[Minimum generative time (years)?] Moderate to rapid growth.
701	2011. San Diego Chapter of the American Society of the Landscape Architects and San Diego Chapter of the California Native Plant Society. San Diego County invasive ornamental plant guide. http://www.asla-sandiego.org/Download/PG_08_mod.pdf	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Yes] Used as a street tree. Produces abundant seed.
702	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Propagules dispersed intentionally by people? Yes] Planted extensively in the United States.

702	2007. Ghelardini, L.. Bud burst phenology, dormancy release and susceptibility to Dutch elm disease in elms (<i>Ulmus</i> spp.). http://pub.epsilon.slu.se/1671/1/978-91-85913-33-6.pdf	[Propagules dispersed intentionally by people? Yes] <i>Ulmus parvifolia</i> is not susceptible to Dutch elm disease and it is today the most ubiquitous elm species, being successfully introduced in Europe, Northern America, Southern Africa and New Zealand.
703	2011. WRA Specialist. Personal Communication.	Propagules likely to disperse as a produce contaminant? No] No evidence of produce contamination.
704	2006. Xinhua, L./Xiaoming, Y./Bing, X./Weilin, L./Y, L.. Effects of bird seed dispersal on diversity of the invaded plants in several hedge types. <i>Acta Ecologica Sinica</i> . 26: 1657-1666.	[Propagules adapted to wind dispersal? Yes] Wind dispersed.
704	2011. USDA Forest Service. Weed of the week - <i>Ulmus parvifolia</i> . U.S> Forest Service, Newton Square http://na.fs.fed.us/fhp/invasive_plants/weeds/chinese-elm.pdf	[Propagules adapted to wind dispersal? Yes] "The seeds are winged and are dispersed primarily by the wind."
705	2010. Nomiya, H.. Differentiation of seed germination traits in relation to the natural habitats of three <i>Ulmus</i> species in Japan. <i>Journal of Forest Research</i> . 15: 123-130.	[Propagules water dispersed? Yes] <i>Ulmus parvifolia</i> is distributed in the floodplain forests of the warm temperate zone.
706	2006. Xinhua, L./Xiaoming, Y./Bing, X./Weilin, L./Y, L.. Effects of bird seed dispersal on diversity of the invaded plants in several hedge types. <i>Acta Ecologica Sinica</i> . 26: 1657-1666.	[Propagules bird dispersed? No] Wind dispersed.
707	2006. Xinhua, L./Xiaoming, Y./Bing, X./Weilin, L./Y, L.. Effects of bird seed dispersal on diversity of the invaded plants in several hedge types. <i>Acta Ecologica Sinica</i> . 26: 1657-1666.	[Propagules dispersed by other animals (externally)? No] Wind dispersed.
708	2011. WRA Specialist. Personal Communication.	[Propagules survive passage through the gut?] Unknown.
801	2011. WRA Specialist. Personal Communication.	[Prolific seed production (>1000/m ²)?] Unknown.
802	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Evidence that a persistent propagule bank is formed (>1 yr)?] Seed storage orthodox.
802	2010. Nomiya, H.. Differentiation of seed germination traits in relation to the natural habitats of three <i>Ulmus</i> species in Japan. <i>Journal of Forest Research</i> . 15: 123-130.	[Evidence that a persistent propagule bank is formed (>1 yr)?] "The autumn-fruiting <i>Ulmus parvifolia</i> , distributed in warm-temperate regions, showed the highest proportion of primary dormancy among the three <i>Ulmus</i> species. Notably, <i>Ulmus parvifolia</i> showed no increase in germination rate under good light conditions in comparison with dark conditions. For higher seedling survival, it is advantageous to be strictly dormant during seed dissemination, considering the inevitable warm climate during the seed dissemination season and the remaining short growing period. Seed dormancy of <i>Ulmus parvifolia</i> seeds can be broken easily by a sufficient chilling period in winter, and <i>Ulmus parvifolia</i> seeds germinate immediately when the temperature becomes high enough in the following spring. Only portion of the seeds buried in the soil under dark and stable temperature conditions will be maintained as a seed bank. Higa et al. (2006) suggested that the seeds of <i>Ulmus parvifolia</i> , even under the dry chilling period, can maintain their germination ability, and this seed trait contributes to the regeneration of <i>Ulmus parvifolia</i> on the hot and dry gravel zone along the river."
802	2011. Barbour, J.R./Brinkman, K.A.. <i>Ulmus</i> L. - elm. U.S. Forest Service, http://www.nsl.fs.fed.us/wpsm/Ulmus.pdf	[Evidence that a persistent propagule bank is formed (>1 yr)?] Seed stored at 0 degrees Celsius have a viability of 1/2 year.
803	2011. USDA Forest Service. Weed of the week - <i>Ulmus parvifolia</i> . U.S> Forest Service, Newton Square http://na.fs.fed.us/fhp/invasive_plants/weeds/chinese-elm.pdf	[Well controlled by herbicides? Yes] "Chemical- It can be effectively controlled using any of several readily available general use herbicides such as triclopyr or imazapyr. Use stem injections, cut-treat, and soil spots, with basal and foliar sprays for seedlings and saplings. Follow label and state requirements."
804	2011. Daves' Garden. PlantFiles - Chinese elm, lacebark elm - <i>Ulmus parvifolia</i> . Dave's Garden, http://davesgarden.com/guides/pf/go/173/	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "This is a highly invasive tree that sends out runners and sprouts. My neighbor had one in his yard and cut it down. In my yard I still have many sprouts growing that came up from his tree, despite my active and laborious removal of them. The sprouts quickly grow into trees. Be warned!"

804	2011. Plants for a Future. <i>Ulmus parvifolia</i> [Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] Coppices. [online database]. Plants for a Future, http://www.pfaf.org/user/Plant.aspx?LatinName=Ulmus%20parvifolia
805	2011. WRA Specialist. Personal Communication. [Effective natural enemies present locally (e.g. introduced biocontrol agents)?] Unknown.
