

Family: *Sapindaceae*

Taxon: *Acer rubrum*

Synonym: *Acer rubrum f. tomentosum (Tausch) Voss* **Common Name:** Red maple

Questionnaire :	current 20090513	Assessor:	Chuck Chimera	Designation: H(HPWRA)
Status:	Assessor Approved	Data Entry Person:	Chuck Chimera	WRA Score 8
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)	Low
202	Quality of climate match data		(0-low; 1-intermediate; 2-high) (See Appendix 2)	Intermediate
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	n
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)	
304	Environmental weed		n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed		n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs		y=1, n=0	n
402	Allelopathic		y=1, n=0	n
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	y
406	Host for recognized pests and pathogens		y=1, n=0	y
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
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	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	y
604	Self-compatible or apomictic	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	>3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m ²)	y=1, n=-1	y
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	n
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 8

Supporting Data:

101	1990. Burns, R.M./Honkala, B.H.. Silvics of North America. Volume 2: Hardwoods. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC.	[Is the species highly domesticated? No] "As might be expected from its wide range, red maple shows great variation in height, cold hardiness, straightness, time of flushing, onset of dormancy, and other traits. In general, red maples in the north show the most reddish autumn color, earliest flushing and bud set, and least winter injury. Seeds from the north-central and east-central range produce the tallest seedlings. Genetic potential has been found for breeding and selecting red maple against three major urban stresses: verticillium wilt, air pollution, and drought (52,53). Red maple fruits also exhibit geographical variation. The more northerly sources, from locations with short frost-free periods, produced samaras that are shorter but heavier than those from southern sources (51,66)." [No evidence of reduced competitive ability]
101	2006. USDA NRCS. Plant Guide - Red Maple - <i>Acer rubrum</i> . USDA NRCS National Plant Data Center & the Biota of North America Program, http://plants.usda.gov/plantguide/pdf/pg_acru.pdf	[Is the species highly domesticated? No] "Many cultivars of red maple have been developed. Selections have been made for color tints and brightness, timing of onset of coloration, crown shape and branching pattern, cold hardiness, leaf size, only male flowers (no seeds or seedlings), and leafhopper resistance." [only producing male flowers would reduce invasiveness, but only if no naturally occurring trees were present in area]
102	2011. WRA Specialist. Personal Communication.	NA
103	2011. WRA Specialist. Personal Communication.	NA
201	1990. Burns, R.M./Honkala, B.H.. Silvics of North America. Volume 2: Hardwoods. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC.	[Species suited to tropical or subtropical climate(s) 0-Low] "Red maple is one of the most abundant and widespread trees in eastern North America (26). It grows from southern Newfoundland, Nova Scotia, and southern Quebec to southern and southwestern Ontario, extreme southeastern Manitoba, and northern Minnesota; south to Wisconsin, Illinois, Missouri, eastern Oklahoma, and eastern Texas; and east to Florida (33). It has the greatest continuous range along the Atlantic Coast of any tree found in Florida-an extent of 2575 km (1,600 mi) (32). The species is native to all regions of the United States east of the 95th meridian, with three exceptions: Prairie Peninsula proper of the Midwest, the coastal prairie of southern Louisiana and southeastern Texas, and the swamp prairie of the Florida Everglades. The most notable exception is the Prairie Peninsula, where red maple is absent from the bottom land forests of the Corn Belt, though it grows abundantly in similar situations and species associations both to the north and south of the Peninsula (54)." [mostly temperate, but range extends into Florida, which is marginally sub-tropical]
202	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Quality of climate match data 1-intermediate] "A. rubrum is not deliberately planted for direct economic benefit, i.e., timber value. However, it is planted in a wide range of locations throughout and outside its natural range for its ornamental, aesthetic, and shade values. This is particularly true of the many cultivars that have been derived from this species. Many of these have been planted as far west in the continental USA as Oregon, in Hawaii, and locations throughout Europe and Australia." [grown in Hawaii and grows naturally in Florida, marginally subtropical]
203	1990. Burns, R.M./Honkala, B.H.. Silvics of North America. Volume 2: Hardwoods. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC.	[Broad climate suitability (environmental versatility)? Yes] "It has great ecological amplitude from sea level to about 900 m (3,000 ft) and grows over a wide range of microhabitat sites...Of all the maples, it has the widest tolerance to climatic conditions."
203	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Broad climate suitability (environmental versatility)? Yes] "Altitude range: 0 - 1800 m" [Elevation range >1000 m; demonstrating environmental versatility]
204	2007. Randall, R.P.. Global Compendium of Weeds - <i>Acer rubrum</i> [Online Database]. http://www.hear.org/gcw/species/acer_rubrum/	[Native or naturalized in regions with tropical or subtropical climates? No] No evidence that species has naturalized in tropical or subtropical climate
205	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Does the species have a history of repeated introductions outside its natural range? Yes] "A. rubrum is not deliberately planted for direct economic benefit, i.e., timber value. However, it is planted in a wide range of locations throughout and outside its natural range for its ornamental, aesthetic, and shade values. This is particularly true of the many cultivars that have been derived from this species. Many of these have been planted as far west in the continental USA as Oregon, in Hawaii, and locations throughout Europe and Australia."
301	2006. USDA NRCS. Plant Guide - Red Maple - <i>Acer rubrum</i> . USDA NRCS National Plant Data Center & the Biota of North America Program, http://plants.usda.gov/plantguide/pdf/pg_acru.pdf	[Naturalized beyond native range? Yes] "Its distribution has been increased past its native range through broad cultivation and naturalization of the cultivated forms."

302	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Garden/amenity/disturbance weed? Yes] "A. rubrum is a sub-climax or mid-seral species, but its ability to sprout vigorously, to produce prolific seed crops, and to compete successfully enable this species to pioneer on a variety of disturbed sites...Aggressive colonizer."
302	2006. USDA NRCS. Plant Fact Sheet - Red Maple - <i>Acer rubrum</i> . USDA NRCS New York State Office, http://plants.usda.gov/factsheet/pdf/fs_acru.pdf	[Garden/amenity/disturbance weed? Yes] "Weediness: This plant may become weedy or invasive in some regions or habitats and may displace desirable vegetation if not properly managed."
302	2009. Greater Vancouver Invasive Plant Council. Invasive Plants in Greater Vancouver. www.gvipc.ca	[Garden/amenity/disturbance weed? Yes] "An emerging invasive plant in GVRD. Cultivars on campus: <i>Acer rubrum</i> 'Bowhall', <i>Acer rubrum</i> 'Red Sunset'...Emerging invasive plants are currently found in isolated, sparse populations but are rapidly expanding their range within the region. Management is aimed at containing or eliminating populations and minimizing spread to new areas. Early detection and rapid response to new invaders can lead to their successful eradication."
302	2011. USDA Forest Service Northeast Research Station. Climate Change Tree Atlas - red maple (<i>Acer rubrum</i>). http://www.nrs.fs.fed.us/atlas/tree/RFtreemod_316.html#	[Garden/amenity/disturbance weed? Yes] "aggressively colonizes disturbed sites and also becomes established in a variety of understory conditions; responds rapidly to release" [Possesses attributes of a disturbance adapted weed]
303	2003. Darbyshire, S.J.. Inventory of Canadian Agricultural Weeds. Agriculture and Agri-Food Canada, Research Branch,, Ottawa, Canada	[Agricultural/forestry/horticultural weed? Potentially] "Tree; mesic to wet soils, blueberry fields, pastures, silviculture areas, thickets, bogs, swamps and forests; possibly toxic to livestock; common." [because of potential livestock toxicity, listed among Canadian Agricultural Weeds, but no indication of economic loss or control]
303	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Agricultural/forestry/horticultural weed? Potentially yes] "Aggressive colonizer. Browse is toxic to cattle and horses, particularly in summer and late autumn. Foliage is prone to damage by air pollution."
304	2007. Randall, R.P.. Global Compendium of Weeds - <i>Acer rubrum</i> [Online Database]. http://www.hear.org/gcw/species/acer_rubrum/	[Environmental weed? No] No evidence
305	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Congeneric weed? Yes] <i>Acer negundo</i> , <i>Acer platanoides</i> & <i>Acer pseudoplatanus</i>
305	2008. Galbraith-Kent, S.L./Handel, S.N.. Invasive <i>Acer platanoides</i> inhibits native sapling growth in forest understory communities. <i>Journal of Ecology</i> . 96: 293–302.	[Congeneric weed? Yes] "This experiment showed that native sapling growth was inhibited (i) when growing beneath an invasive canopy and (ii) when competing with <i>A. platanoides</i> in forest understory communities. It appears canopy type is more important, because the negative effects from an invasive canopy were strong enough that the co-occurrence of invasive saplings had no impact on native growth. The capability of <i>A. platanoides</i> to inhibit native saplings through understory competition and overstorey canopy effects, while not affecting conspecifics, may contribute to its success as an invader of North American forests."
401	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Produces spines, thorns or burrs? No] " <i>A. rubrum</i> is a medium-size tree (18-27 m tall and 46-76 cm diameter) that is one of the most abundant and widespread trees in eastern North America, occurring throughout the eastern deciduous forest and into the fringe areas of the boreal forest." [no such structures]
402	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Allelopathic? No] No evidence of allelopathy
403	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Parasitic? No] " <i>A. rubrum</i> is a medium-size tree (18-27 m tall and 46-76 cm diameter) that is one of the most abundant and widespread trees in eastern North America, occurring throughout the eastern deciduous forest and into the fringe areas of the boreal forest."
404	1990. Burns, R.M./Honkala, B.H.. <i>Silvics of North America. Volume 2: Hardwoods</i> . Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC.	[Unpalatable to grazing animals? No] "Red maple is a desirable deer food and reproduction may be almost completely suppressed in areas of excessive deer populations. Snowshoe hares may also reduce the amount of red maple reproduction."
404	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Unpalatable to grazing animals? No] "Aggressive colonizer. Browse is toxic to cattle and horses, particularly in summer and late autumn." [toxic, but apparently still eaten by animals]
404	2006. USDA NRCS. Plant Guide - Red Maple - <i>Acer rubrum</i> . USDA NRCS National Plant Data Center & the Biota of North America Program, http://plants.usda.gov/plantguide/pdf/pg_acru.pdf	[Unpalatable to grazing animals? No] "White-tailed deer, moose, elk browse red maple, and rabbits, which find the stump sprouts especially palatable, especially in fall and winter."

405	1997. Weber, M./Miller, R.E.. Presumptive Red Maple (<i>Acer rubrum</i>) Toxicosis in Grevy's Zebra (<i>Equus grevyi</i>). <i>Journal of Zoo and Wildlife Medicine</i> . 8(1): 105-108.	[Toxic to animals? Yes] "Red maple (<i>Acer rubrum</i>) toxicosis in horses was first reported in 1981, and cases have been reported throughout the red maple tree's range across eastern North America. The disease is seasonal, with most cases occurring between June and November. Clinical signs range from peracute death to depression, anorexia, polypnea, and hematuria. Hematologic changes include anemia, hemolysis, Heinz body formation, and elevated white blood cell count. Methemoglobinemia occurs in some cases and is associated with high mortality. Ingestion of wilted or dried leaves from red maple trees induces the characteristic clinical signs in horses. A toxin has not been isolated, but probably it is an oxidant, based on the presence of Heinz bodies and methemoglobin. In this paper, we describe two cases of suspected red maple toxicosis in Grevy's zebra (<i>Equus grevyi</i>) at the St. Lou is Zoo."
405	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Toxic to animals? Yes] "Aggressive colonizer. Browse is toxic to cattle and horses, particularly in summer and late autumn. Foliage is prone to damage by air pollution."
406	1990. Burns, R.M./Honkala, B.H.. <i>Silvics of North America. Volume 2: Hardwoods. Agriculture Handbook 654</i> . U.S. Department of Agriculture, Forest Service, Washington, DC.	[Host for recognized pests and pathogens? Yes] "Red maple is susceptible to many leaf diseases, generally of minor importance. It is seldom or seriously damaged by root diseases, although <i>Armillaria mellea</i> can enter through root or butt wounds. However, <i>A. mellea</i> kills only trees already weakened from other causes (18)...Many different insects feed on red maple, but probably none of them kill healthy trees. They do reduce vigor and growth leaving the tree more susceptible to attack from fungi. Insect feeding also may hasten the death of weakened trees. Susceptibility to insect attack is illustrated by a study in the Piedmont. Of 40 species investigated, red maple had the highest percentage (79 percent) of insect attacks. Among the more important borers attacking red maple were the gallmaking maple borer (<i>Xylotrechus aceris</i>), the maple callus borer (<i>Synanthedon acerni</i>), and the Columbian timber beetle (<i>Corthylus columbianus</i>). The common scale insects included the cottony maple scale (<i>Pulvinaria vitis</i>), the maple leaf scale (<i>P. acericola</i>), and the oystershell scale (<i>Lepidosaphes ulmi</i>). The common leaf feeding moths were the gypsy moth (<i>Lymantria dispar</i>), the linden looper (<i>Erannis tiliaria</i>), the elm spanworm (<i>Ennomos subsignaria</i>), and the red maple spanworm (<i>Itame pustularia</i>). The forest tent caterpillar (<i>Malacosoma disstria</i>) avoids red maple, however (26)."

406	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Host for recognized pests and pathogens? Yes] "Pests recorded Insects: Anoplophora glabripennis (Asian longhorned beetle) Coptotermes formosanus (Formosan termite) Corthylus columbianus Corthylus punctatissimus (pitted ambrosia beetle) Ennomos subsignarius (elm spanworm) Erannis tiliaria (linden looper) Itame pustularia Lepidosaphes ulmi (oystershell scale) Lymantria dispar (gypsy moth) Malacosoma americanum (eastern tent caterpillar) Operophtera brumata (winter moth) Orgyia leucostigma (white-marked tussock moth) Pulvinaria acericola Pulvinaria vitis (cottony maple, scale) Synanthedon acerni Thyridopteryx ephemeraeformis (evergreen bagworm) Xylotrechus aceris Nematodes: Pratylenchus brachyurus (root lesion nematode) Trichodorus (stubby root nematodes) Xiphinema americanum (dagger nematode) Fungus diseases: Armillaria mellea (armillaria root rot) Armillaria tabescens (armillaria root rot) Inonotus glomeratus Nectria galligena (Nectria canker (apple, pear)) Oxyporus populinus Phellinus igniarius (hardwood trunk rot) Bacterial diseases: Pseudomonas syringae Pests recorded at the generic level (Acer): Insects: Acrosternum hilare (green stink bug) Aeolesthes sarta (city longhorn beetle) Anoplophora glabripennis (Asian longhorned beetle) Boisea trivittata (boxelder bug) Cacoecimorpha pronubana (carnation tortrix) Ceroplastes rubens (red wax scale) Coccus hesperidum (brown soft scale) Cossus cossus (carpenter moth) Diaspidiotus ostreaeformis (pear oyster scale) Diaspidiotus perniciosus (San José scale) Drepanosiphum platanoidis Erannis defoliaria (mottled umber moth) Euproctis chrysorrhoea (brown-tail moth) Hyphantria cunea (mulberry moth) Lymantria dispar (gypsy moth) Operophtera brumata (winter moth) Pammene fasciana Parthenolecanium corni (European fruit lecanium) Peridroma saucia (pearly underwing moth) Periphyllus californiensis (California acer aphid) Popillia japonica (Japanese beetle) Pseudaulacaspis pentagona (mulberry scale) Rosellinia necatrix (dematophora root rot) Saturnia pyri (giant emperor moth) Taeniothrips inconsequens (pear thrips) Tetrotipium castaneum (black spruce beetle) Tortrix viridana (green oak leaf-roller) Trichoderus campestris Zeuzera pyrina (moth, wood leopard) Mites: Brevipalpus phoenicis (false spider mite) Nematodes: Pratylenchus penetrans (nematode, northern root lesion) Fungus diseases: Apiognomonium errabunda (anthracnose) Armillaria mellea (armillaria root rot) Fomes fomentarius (hoof fungus) Ganoderma lucidum (basal stem rot: Hevea spp.) Glomerella cingulata (anthracnose) Phellinus igniarius (hardwood trunk rot) Phytophthora cactorum (apple collar rot) Uncinula bicornis (powdery mildew: Acer spp.) Bacterial diseases: Rhizobium radiobacter (crown gall) Rhizobium rhizogenes (gall) Xylella fastidiosa (Pierce's disease of grapevines) Pests recorded at the family level (Aceraceae): Insects: Cryptotermes brevis (powderpost termite)"
407	2006. USDA NRCS. Plant Guide - Red Maple - Acer rubrum. USDA NRCS National Plant Data Center & the Biota of North America Program, http://plants.usda.gov/plantguide/pdf/pg_acru.pdf	[Causes allergies or is otherwise toxic to humans? No] "The sap of red maple is sometimes used for producing maple syrup. Although its sap has only about half the sugar content as sugar maple (<i>A. saccharum</i>), the syrup tastes good. Saponins in the sap may cause excessive frothing of the concentrate. Native Americans used red maple bark as an analgesic, wash for inflamed eyes and cataracts, and as a remedy for hives and muscular aches. Tea brewed from the inner bark has been used for treating coughs and diarrhea. Pioneers made cinnamon-brown and black dyes from a bark extract. Iron sulphate was added to the tannin from red maple bark to make ink." [multiple human uses with no evidence of toxicity or allergies]
408	2011. USDA Forest Service Northeast Research Station. Climate Change Tree Atlas - red maple (<i>Acer rubrum</i>). http://www.nrs.fs.fed.us/atlas/tree/RFTreemod_316.html#	[Creates a fire hazard in natural ecosystems? No] "Fire: Red maple is favored when fire is suppressed and, in many of the forests where it occurs it has increased in dominance dramatically during the past decades. The fire interval for red maple is long (many decades to centuries) and low-intensity surface fires are typical. A thin-barked species, red maple is susceptible to damage, topkill and mortality from fire. Saplings are more susceptible than larger, thicker-barked individuals. Fire effects vary according to season of burning; red maple is most susceptible in late spring to early summer. Topkilled seedlings and trees sprout vigorously and rapidly from dormant buds on the root crown. Seedling establishment may occur from surviving trees onsite or from offsite seeds carried by wind. This species may assume increased prominence after a single (unrepeated) fire. Prescribed fires, particularly multiple fires, have been used to control red maple but as trees become larger and bark thickens, they become more resistant." [no evidence that this species increases fire hazards]
409	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Is a shade tolerant plant at some stage of its life cycle? Yes] "Generally, <i>A. rubrum</i> is tolerant of shade, and seedlings will persist in the understorey for several years. Seedlings will respond to overstorey removal and grow rapidly to occupy overstorey space."

410	1990. Burns, R.M./Honkala, B.H.. Silvics of North America. Volume 2: Hardwoods. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC.	[Tolerates a wide range of soil conditions? Yes] "Red maple can probably thrive on a wider range of soil types, textures, moisture, pH, and elevation than any other forest species in North America (18). Its range covers soils of the following orders: Entisols, Inceptisols, Ultisols, Alfisols, Spodosols, and Histosols. It grows on both glaciated and nonglaciated soils derived from granite, gneisses, schists, sandstone, shales, slates, conglomerates, quartzites, and limestone (26)."
410	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates a wide range of soil conditions? Yes] "Soil descriptors - Soil texture: light; medium; heavy - Soil drainage: free; impeded; seasonally waterlogged - Soil reaction: acid; neutral - Special soil tolerances: shallow"
411	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Climbing or smothering growth habit? No] "A. rubrum is a medium-size tree (18-27 m tall and 46-76 cm diameter) that is one of the most abundant and widespread trees in eastern North America, occurring throughout the eastern deciduous forest and into the fringe areas of the boreal forest."
412	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Forms dense thickets? No] "Aggressive colonizer" [can dominate successional sites in early stages, but no evidence that this species excludes other vegetation]
501	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Aquatic? No] "A. rubrum is a medium-size tree (18-27 m tall and 46-76 cm diameter) that is one of the most abundant and widespread trees in eastern North America, occurring throughout the eastern deciduous forest and into the fringe areas of the boreal forest."
502	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Grass? No] "A. rubrum is a medium-size tree (18-27 m tall and 46-76 cm diameter) that is one of the most abundant and widespread trees in eastern North America, occurring throughout the eastern deciduous forest and into the fringe areas of the boreal forest" [Aceraceae / Sapindaceae]
503	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	[Nitrogen fixing woody plant? No] "Sapindaceae subfamily: Hippocastanoideae. Also placed in: Aceraceae"
504	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "A. rubrum is a medium-size tree (18-27 m tall and 46-76 cm diameter) that is one of the most abundant and widespread trees in eastern North America, occurring throughout the eastern deciduous forest and into the fringe areas of the boreal forest."
601	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Evidence of substantial reproductive failure in native habitat? No] "A. rubrum is a sub-climax or mid-seral species, but its ability to sprout vigorously, to produce prolific seed crops, and to compete successfully enable this species to pioneer on a variety of disturbed sites."
602	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Produces viable seed? Yes] "A. rubrum is a sub-climax or mid-seral species, but its ability to sprout vigorously, to produce prolific seed crops, and to compete successfully enable this species to pioneer on a variety of disturbed sites."
603	1990. Burns, R.M./Honkala, B.H.. Silvics of North America. Volume 2: Hardwoods. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC.	[Hybridizes naturally? Yes] "Experimental crosses of red and silver maple have been made (26). Also, red maple is known to hybridize naturally with silver maple (33)."
604	1985. Batra, S.W.T.. Red Maple (<i>Acer rubrum</i> L.), an Important Early Spring Food Resource for Honey Bees and Other Insects. Journal of the Kansas Entomological Society. 58(1): 169-172.	[Self-compatible or apomictic? No] "The normally dioecious, dichogamous red maple (<i>Acer rubrum</i> L.) has small, dry, loose, abundant pollen grains; functionally unisexual flowers exposed before leaves appear; exposed anthers and stigmas; reduced perianth, and only 2 ovules per flower."
604	1990. Burns, R.M./Honkala, B.H.. Silvics of North America. Volume 2: Hardwoods. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC.	[Self-compatible or apomictic? No] "Red maple flowers are structurally perfect. The species is polygamo-dioecious. Thus, some trees are entirely male, producing no seeds; some are entirely female; and some are monoecious, bearing both male and female flowers. On monoecious trees, functioning male and female flowers usually are separated on different branches. Sex of the flower is not a function of tree vigor. The species shows a tendency toward dioeciousness rather than toward dichogamy."
605	2006. USDA NRCS. Plant Guide - Red Maple - <i>Acer rubrum</i> . USDA NRCS National Plant Data Center & the Biota of North America Program, http://plants.usda.gov/plantguide/pdf/pg_acru.pdf	[Requires specialist pollinators? No] "Most references describe red maple as wind pollinated, but insect pollination may be important, as many insects, especially bees, visit the flowers."
605	2011. USDA Forest Service Northeast Research Station. Climate Change Tree Atlas - red maple (<i>Acer rubrum</i>). http://www.nrs.fs.fed.us/atlas/tree/RFtreemod_316.html#	[Requires specialist pollinators? No] "Pollination Agent: wind"

606	2006. USDA NRCS. Plant Guide - Red Maple - <i>Acer rubrum</i> . USDA NRCS National Plant Data Center & the Biota of North America Program, http://plants.usda.gov/plantguide/pdf/pg_acru.pdf	[Reproduction by vegetative fragmentation? No] "Vegetative reproduction under natural conditions is common from sprouts from the stump or root crown or root suckers after fire or mechanical damage. Buds located at the base of stems commonly sprout 2-6 weeks after the stem is cut" [spreads around base of tree, but does not spread by vegetative fragments]
607	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Minimum generative time (years)? 4+] "A. rubrum is one of the first trees to flower in the spring, and can bear seed as early as age 4 years."
607	2011. USDA Forest Service Northeast Research Station. Climate Change Tree Atlas - red maple (<i>Acer rubrum</i>). http://www.nrs.fs.fed.us/atlas/tree/RFtreemod_316.html#	[Minimum generative time (years)? 4+] "Seeding, yrs (begins/optimal/declines): 5/35/80"
701	2006. USDA NRCS. Plant Guide - Red Maple - <i>Acer rubrum</i> . USDA NRCS National Plant Data Center & the Biota of North America Program, http://plants.usda.gov/plantguide/pdf/pg_acru.pdf	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] "Fruits: winged nutlets (samaras) in a pair, 2.5 cm long, clustered on long stalks, red to red-brown." [unlikely, as seeds are relatively large and with no means of external attachment]
702	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Propagules dispersed intentionally by people? Yes] "A. rubrum is also planted as an ornamental and shade tree, with trees at least in the northern part of its range producing brilliant red foliage after the first frost in the autumn."
703	2006. USDA NRCS. Plant Guide - Red Maple - <i>Acer rubrum</i> . USDA NRCS National Plant Data Center & the Biota of North America Program, http://plants.usda.gov/plantguide/pdf/pg_acru.pdf	[Propagules likely to disperse as a produce contaminant? No] "Fruits: winged nutlets (samaras) in a pair, 2-2.5 cm long, clustered on long stalks, red to red-brown." [unlikely, as seeds are relatively large]
704	1990. Burns, R.M./Honkala, B.H.. Silvics of North America. Volume 2: Hardwoods. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC.	[Propagules adapted to wind dispersal? Yes] "Because the fruits are small and winged, they disperse efficiently in the wind."
704	2011. USDA Forest Service Northeast Research Station. Climate Change Tree Atlas - red maple (<i>Acer rubrum</i>). http://www.nrs.fs.fed.us/atlas/tree/RFtreemod_316.html#	[Propagules adapted to wind dispersal? Yes] "Seed Type/Dispersal Distance/Agent: winged/ to 200 m/ wind"
705	2006. USDA NRCS. Plant Guide - Red Maple - <i>Acer rubrum</i> . USDA NRCS National Plant Data Center & the Biota of North America Program, http://plants.usda.gov/plantguide/pdf/pg_acru.pdf	[Propagules water dispersed? No] "Fruits: winged nutlets (samaras) in a pair, 2-2.5 cm long, clustered on long stalks, red to red brown." [primarily adapted for wind dispersal]
706	2006. USDA NRCS. Plant Guide - Red Maple - <i>Acer rubrum</i> . USDA NRCS National Plant Data Center & the Biota of North America Program, http://plants.usda.gov/plantguide/pdf/pg_acru.pdf	[Propagules bird dispersed? No] "Fruits: winged nutlets (samaras) in a pair, 2-2.5 cm long, clustered on long stalks, red to red-brown." [Not fleshy-fruited]
707	2006. USDA NRCS. Plant Guide - Red Maple - <i>Acer rubrum</i> . USDA NRCS National Plant Data Center & the Biota of North America Program, http://plants.usda.gov/plantguide/pdf/pg_acru.pdf	[Propagules dispersed by other animals (externally)? Yes] "The seeds, buds and flowers are eaten by various wildlife species. Squirrels and chipmunks store the seeds." [animals externally transport seeds which could later germinate if not eaten. Introduced rodents may fill a similar role in oceanic islands]
708	2006. USDA NRCS. Plant Guide - Red Maple - <i>Acer rubrum</i> . USDA NRCS National Plant Data Center & the Biota of North America Program, http://plants.usda.gov/plantguide/pdf/pg_acru.pdf	[Propagules survive passage through the gut? No] "The seeds, buds and flowers are eaten by various wildlife species. Squirrels and chipmunks store the seeds." [animals that consume seeds are seed predators, not dispersers]
801	1990. Burns, R.M./Honkala, B.H.. Silvics of North America. Volume 2: Hardwoods. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC.	[Prolific seed production (>1000/m2)? Yes] "A seed crop occurs almost every year, and on an average, a good to bumper crop occurs once in every 2 years (14). Red maple is generally very fruitful. Trees 5 to 20 cm in d.b.h. (2 to 8 in) can yield seed crops of 12,000 to 91,000 seeds. A 30-cm (12-in) tree yielded nearly a million seeds"
801	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Prolific seed production (>1000/m2)? Yes] "A. rubrum is a sub-climax or mid-seral species, but its ability to sprout vigorously, to produce prolific seed crops, and to compete successfully enable this species to pioneer on a variety of disturbed sites."

802	2005. Lambers, J.H.R./Clark, J.S.. The benefits of seed banking for red maple (<i>Acer rubrum</i>): maximizing seedling recruitment. Canadian Journal of Forest Research. 35: 806–813.	[Evidence that a persistent propagule bank is formed (>1 yr)? Yes] "Our results suggest that seed banking may increase seedling recruitment of red maple by maximizing the chance that seedlings experience conditions conducive to seedling survival. At our sites, few red maple seeds are dormant following dispersal (Fig. 1A), when conditions are relatively favorable for seedling survival (Fig. 1C). Seedlings emerging late in the growing season are less likely to survive (Table 1, Fig. 1C; Jones and Sharitz 1989; Jones et al. 1997), but by then fewer seeds germinate (Fig. 1B). This occurs because seed dormancy increases as the growing season progresses (Fig. 1A), that of both freshly dispersed seeds and seeds on the forest floor (Figs. 1C, 2A). Postponing germination for 1 year appears to be a common phenomenon; the autumn density of seeds in seed banks as compared to spring seed rain and summer seedling densities suggests that a significant number of red maple seedlings recruit from persistent seed banks"
802	2006. USDA NRCS. Plant Guide - Red Maple - <i>Acer rubrum</i> . USDA NRCS National Plant Data Center & the Biota of North America Program, http://plants.usda.gov/plantguide/pdf/pg_acru.pdf	[Evidence that a persistent propagule bank is formed (>1 yr)? Yes] "Seedbed requirements are minimal and up to 95% of viable seeds germinate in the first 10 days; some survive in the duff and germinate the following year."
802	2008. Royal Botanic Gardens Kew. Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/	[Evidence that a persistent propagule bank is formed (>1 yr)? Yes] "Storage Behaviour Storage Behaviour: Orthodox Storage Conditions: 100% germination following 23 years storage in laboratory (Harrington, 1972); complete loss in viability after 14-15 years hermetic storage at 2°-4°C with 8.5- 11.6% mc (Wang et al., 1994)"
802	2011. USDA Forest Service Northeast Research Station. Climate Change Tree Atlas - red maple (<i>Acer rubrum</i>). http://www.nrs.fs.fed.us/atlas/tree/RFTreemod_316.html#	[Evidence that a persistent propagule bank is formed (>1 yr)? Yes] "Seed Banking: 1 yr +"
803	1990. Burns, R.M./Honkala, B.H.. Silvics of North America. Volume 2: Hardwoods. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC.	[Well controlled by herbicides? No] "Red maple is generally very resistant to herbicides (28). Also, diffuse porous species such as red maple are difficult to kill by girdling. For example, 3 years after treatment, 70 percent of the girdled trees had live crowns (63). Stem injection, using cacodylic acid(12) and picloram (61), did successfully control red maple as did glyphosate applied by hydraulic sprayer; but not when applied by a mist blower (16). Generally, if treatment of red maple is planned, it is wise to consult current labels or experts in the field of chemical control to determine the latest allowable chemicals and the best methods of application."
804	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "A. rubrum is a sub climax or mid-seral species, but its ability to sprout vigorously, to produce prolific seed crops, and to compete successfully enable this species to pioneer on a variety of disturbed sites. It commonly increases after disturbances such as fire, clearcutting, and windthrow ... Because of its vigorous sprouting ability, many second growth stands of A. rubrum are of sprout origin...- Tolerates drought; waterlogging; wind; weeds; shade; salt wind - Ability to sucker; regenerate rapidly; coppice; pollard"
805	2011. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]