

Quercus acutissima (Sawtooth oak)

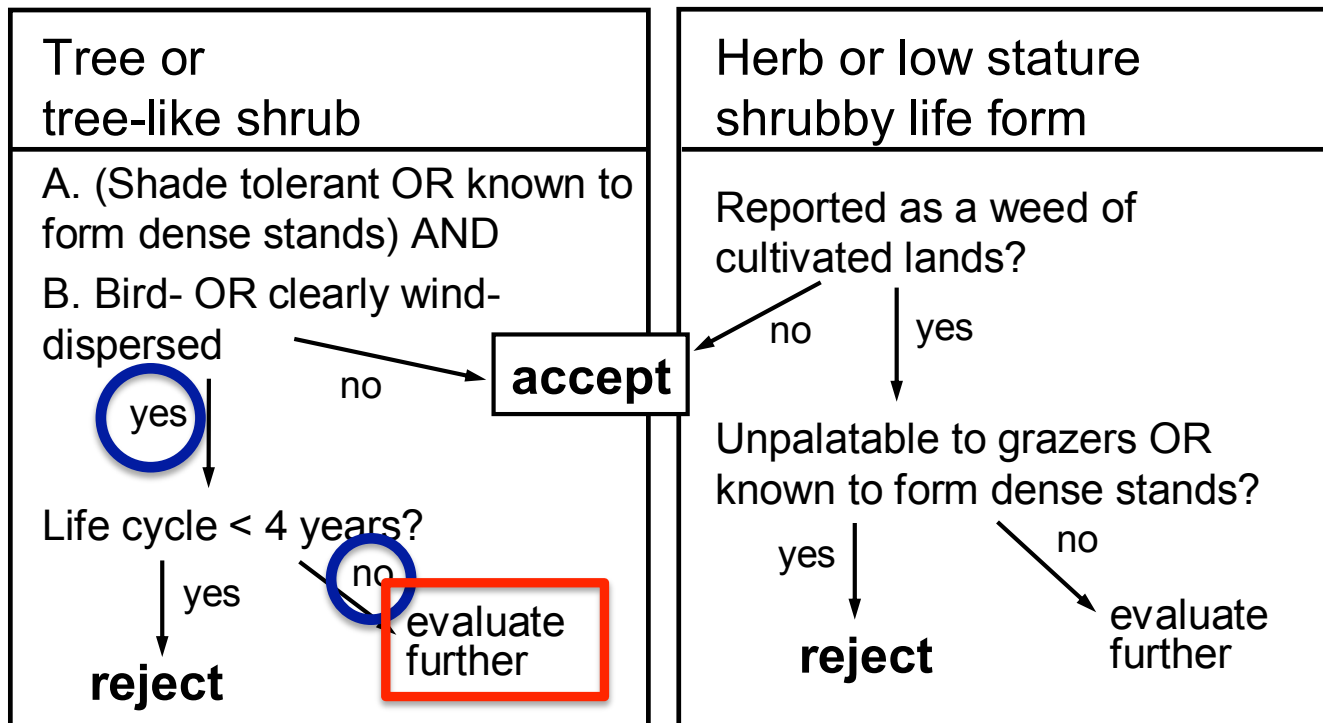
1.01	Is the species highly domesticated?	n	0
1.02	Has the species become naturalised where grown?		
1.03	Does the species have weedy races?		
2.01	Species suited to US climates (USDA hardiness zones; 0-low, 1-intermediate, 2-high).	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high).	2	
2.03	Broad climate suitability (environmental versatility).	y	1
2.04	Native or naturalized with mean annual precipitation of 11-60 inches.	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range.	unk	
3.02	Garden/amenity/disturbance weed	n	0
3.03	Weed of agriculture	n	0
3.04	Environmental weed	n	0
3.05	Congeneric weed	unk	
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	unk	0
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals		
4.05	Toxic to animals	n	0
4.06	Host for recognised pests and pathogens		
4.07	Causes allergies or is otherwise toxic to humans.	y	1
4.08	Creates a fire hazard in natural ecosystems	unk	0
4.09	Is a shade tolerant plant at some stage of its life cycle	y	1
4.10	Grows on any soil order representing >5% cover in the US.	y	1
4.11	Climbing or smothering growth habit	n	0
4.12	Forms dense thickets	n	0
5.01	Aquatic	n	0
5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	n	0
6.02	Produces viable seed	y	1
6.03	Hybridizes naturally	unk	-1
6.04	Self-compatible or apomictic	y	1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative propagation	n	-1
6.07	Minimum generative time (years)	5	-1
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant		
7.04	Propagules adapted to wind dispersal	n	-1
7.05	Propagules water dispersed	unk	-1
7.06	Propagules bird dispersed	n	-1
7.07	Propagules dispersed by other animals (externally)	y	1
7.08	Propagules dispersed by other animals (internally)	n	-1
8.01	Prolific seed production	y	1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	unk	-1
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation		
8.05	Effective natural enemies present in the contiguous US and Alaska	n	1
	Total Score	2	

	Implemented Pacific Second Screening	Yes	
	Risk Assessment Results	Evaluate	
	Completed 1/9/2014		

Secondary Screening

Pacific second screening: decision rules for species with WRA scores between 1 and 6

(from Daehler *et al.* 2004)



Vines must pass both tests

	Reference	Source data
1.01		
1.02		Skip this question
1.03		Skip this question
2.01	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (31 December 2013). 2. PERAL NAPPFAST Global Plant Hardiness (http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10ayear%20climate/PLANT_HARDINESS_10YR%20lgn d.tif).\$\$	No computer analysis was performed. 1. Native to China, eastern Asia, Japan, Korea, India, Nepal, Cambodia, Myanmar, Thailand, Vietnam 2. Global hardiness zones (10?) 9-6 3. USDA Hardiness Zones 5B to 9A in United States
2.02		No computer analysis was performed. Native range is well known; refer to 2.01 source data.
2.03	1. Köppen-Geiger climate map (http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf). 2. Flora of China (http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200006284 [accessed 7 Jan 2014]) 3. Refer to all references in question 2.01.	1. Distribution in the native and cultivated ranges is very widespread and occurs in more than 3 climatic groups including Cfa, Cfb, Csa, Csb, and Bsk. 2. Occurs in native range in deciduous forests 100-2200 m elevation.
2.04	1. USDA PLANTS Database (http://plants.usda.gov [accessed 31 December 2013]). 2. World Climate Maps (http://www.climatecharts.com/World-Climate-Maps.html [accessed 31 December 2013]). 3. Gang (1998) Nutrient cycling characteristics of <i>Quercus acutissima</i> and <i>Pinus massiana</i> mixed forest in the three gorge reservoir area, China. <i>J Env Sci</i> 10:387-384.	1.& 2. Majority of confirmed distribution in US falls in 38.5-58.1 inches annual rainfall in the south-eastern US. 3. Research conducted on <i>Q. acutissima</i> in native range in Hubei Province, China characterized as sub-tropical climate with annual precipitation of 1015 mm (39.96 inches).
2.05	2. Gilman and Watson (2006) <i>Quercus acutissima</i> . EDIS Document #ENH-698, Environmental Horticulture, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. (http://edis.ifas.ufl.edu/st540 [accessed 31 Dec 2013]). 3. Francis and Johnson (1985) Direct-seeded sawtooth oaks (<i>quercus acutissima</i> Carruth.) show rapid growth on diverse sites. <i>Tree Planters Notes</i> Summer:3-5.	Commercially available at nurseries and online (eg. http://www.fast-growing-trees.com/SawtoothOak.htm). 1. Promoted for planting as an urban tree (shade tree, street or parking lot tree, or lawn tree). 2. Planted for food source for wildlife.
3.01		Various datasheets available indicating invasive potential, but naturalization status is unclear.
3.02		No Evidence
3.03		No Evidence
3.04		No Evidence
3.05	1. Holm et al. <i>A Geographical Atlas of World Weeds</i> . New York: John Wiley & Sons. 1979.	1. Multiple <i>Quercus</i> species listed as present in US as weed but specific status unknown.
4.01		No Evidence
4.02		No Evidence
4.03		No evidence
4.04		No Evidence
4.05	1. Whitmore (2004) Sawtooth Oak (<i>Quercus Acutissima</i> , Fagaceae) in North America. <i>Side</i> 24:447-454. 2. Iida (1996) Quantitative analysis of acorn transportation by rodents using magnetic locator. <i>Vegetatio</i> 124:39-43.	1. is widely planted in the eastern United States as a source of food for wildlife (especially turkeys). 2. Squirrels and other rodents create caches of acorns away from seed source to eat later.

4.06	1. Ohio Department of Natural Resources Div of Forestry: Sawtooth Oak. (http://ohiodnr.com/forestry/trees/oak_sawth/tabid/5396/Default.aspx [accessed 31 Dec 2014]) 2. Gilman and Watson (2006) <i>Quercus acutissima</i> . EDIS Document #ENH-698, Environmental Horticulture, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. (http://edis.ifas.ufl.edu/st540 [accessed 31 Dec 2013]).	1. Sawtooth oak is basically pest free. 2. No pests or diseases of major concern although the list of potential pests/pathogens is long. The tree is usually disease/pest free.
4.07	1. <i>Quercus acutissima</i> , North Carolina Cooperative Extension (http://plants.ces.ncsu.edu/plants/all/quercus-acutissima/ [accessed 31 Dec 2013]). 2. Sawtooth Oak, Selectree-Tree Detail Record. Cal Poly Urban Forest Ecosystems Institute (http://selectree.calpoly.edu/treedetail.lasso?rid=1226&-session=selectree:80E314DF02a3e1FE36Jkn16DB161 [accessed 31 Dec 2013])	1. Low toxicity to humans but if acorns and leaves are ingested, could cause stomach pain, constipation and later bloody diarrhea, excessive thirst, and urination. 2. Listed as health hazard (allergy and poisonous) by Cal Poly Urban Forest ecosystems institute.
4.08		No evidence
4.09	1. Ohio Department of Natural Resources Div of Forestry: Sawtooth Oak. (http://ohiodnr.com/forestry/trees/oak_sawth/tabid/5396/Default.aspx [accessed 31 Dec 2014]). 2. PFAF (http://www.pfaf.org [accessed 31 Dec 2014]).	1. It thrives in full sun to partial sun (but is shade tolerant in juvenile stages). 2. It can grow in semi-shade (light woodland) or no shade.
4.10	1. USDA PLANTS Database (http://plants.usda.gov [accessed 31 December 2013]). 2. USDA NRCS Soils (http://www.nrcs.usda.gov/wps/portal/nrcs/site/soils/home/ [accessed 7 Jan 2014]).	1. In the United states, distribution of <i>Q. acutissima</i> overlaps with multiple dominant soil orders including: Ultisols, Aridisols, Alfisols
4.11		No evidence
4.12		No Evidence
5.01	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (31 December 2013).	Fagaceae family
5.02	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (31 December 2013).	Fagaceae family
5.03	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (31 December 2013).	Fagaceae family
5.04	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (31 December 2013).	Fagaceae family
6.01		No Evidence
6.02	1. Borgardt and Nixon (2003) A comparative flower and fruit anatomical study of <i>Quercus acutissima</i> , a biennial-fruiting oak from the Cerris group (Fagaceae). <i>Am J Bot</i> 90:1567-1584. 2. Goelz and Carlson (1997) Growth and seed production of sawtooth oak (<i>Quercus acutissima</i>) 22 years after direct seeding. USDA Forest Srv Research Note SO-388.	1. Most mature fruits collected from study trees in Ithica, NY, contained seed that had an embryo shoot apex with leaf or scale primordia buttresses. 2. Numerous seedlings of sawtooth oaks observed growing in the vicinity of plantations possessing large developing crops.

6.03	1. Invasive Plant Alert Sawtooth Oak, Exotic Plant Management Team (www.nps.gov/cue/.../Quercus%20acutissima%202012%20NCREPMT.pdf [accessed 31 Dec 2013])	1. Hybridization with native oaks is unlikely.
6.04	1. Borgardt and Nixon (2003) A comparative flower and fruit anatomical study of <i>Quercus acutissima</i> , a biennial-fruiting oak from the Cerris group (Fagaceae). <i>Am J Bot</i> 90:1567-1584. 2. Sawtooth Oak, Selectree-Tree Detail Record. Cal Poly Urban Forest Ecosystems Institute (http://selectree.calpoly.edu/treedetail.lasso?rid=1226&-session=selectree:80E314DF02a3e1FE36Jkn16DB161 [accessed 31 Dec 2013])	1. Monoecious
6.05	1. PFAF (http://www.pfaf.org [accessed 31 Dec 2014]). 2. Borgardt and Nixon (2003) A comparative flower and fruit anatomical study of <i>Quercus acutissima</i> , a biennial-fruiting oak from the Cerris group (Fagaceae). <i>Am J Bot</i> 90:1567-1584.	1. Wind pollinated 2. Member of "Amentiferae" in Fagaceae known to be traditionally wind pollinated.
6.06		No Evidence
6.07	1. Westbrook, Thomas, and Lloyd (2010) US Early Detection and Rapid Response System for Invasive Plants Fact Sheet: Sawtooth Oak. (www.ncswma.org/images/Sawtooth_Oak.doc [accessed 31 Dec 2013]). 2. Francis and Johnson (1985) Direct-seeded sawtooth oaks (<i>quercus acutissima</i> Carruth.) show rapid growth on diverse sites. <i>Tree Planters Notes Summer</i> :3-5. 3. Mercer (1969) Sawtooth oak holds promise as wildlife plant for the southeast. <i>Soil Conservation</i> 34: 178. 4. Olsen (1974) <i>Quercus L. oak</i> In: Schopmeyer tech. coord. <i>Seeds of Woody Plants in the United States</i> . Agric Handb 450. Washington DC, USDA, Forest Srv, pp 692-703.	1. Produces acorns at a very young age for oaks especially when compared to natives (5 years vs. 15-20 years). 2. In an experiment at two sites in Mississippi, nearly all planted sawtooth oaks produced acorns by year 14. 3 & 4. Produces acorns as early as the 5 or 6th yr and produces seed crops almost every year thereafter.
7.01		No evidence
7.02	1. Gilman and Watson (2006) <i>Quercus acutissima</i> . EDIS Document #ENH-698, Environmental Horticulture, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. (http://edis.ifas.ufl.edu/st540 [accessed 31 Dec 2013]). 3. Francis and Johnson (1985) Direct-seeded sawtooth oaks (<i>quercus acutissima</i> Carruth.) show rapid growth on diverse sites. <i>Tree Planters Notes Summer</i> :3-5.	Commercially available at nurseries and online (eg. http://www.fast-growing-trees.com/SawtoothOak.htm). 2. Promoted for planting as an urban tree (shade tree, street or parking lot tree, or lawn tree). 3. Planted for food source for wildlife.
7.03		No Evidence
7.04		No evidence
7.05		No Evidence
7.06		No Evidence
7.07	1. Iida (1996) Quantitative analysis of acorn transportation by rodents using magnetic locator. <i>Vegetatio</i> 124:39-43.	1. Squirrels and other rodents create caches of acorns away from seed source to eat later, when conditions are suitable for growth and seeds are left behind, viable seeds will germinate. In a field experiment, it was determined that the average distance seeds were transported was 22.1+ 8.9m and 3% of acorns survived.
7.08		No evidence. The size of the fruits would indicate this is an unlikely form of dispersal.
8.01	1. Goelz and Carlson (1997) Growth and seed production of sawtooth oak (<i>Quercus acutissima</i>) 22 years after direct seeding. USDA Forest Srv Research Note SO-388. 2. Mercer (1969) Sawtooth oak holds promise as wildlife plant for the southeast. <i>Soil Conservation</i> 34: 178.	Multiple sources indicate "prolific acorn production", but non quantify amount. However, sources indicate that the quantity produced by <i>Q. acutissima</i> is greater than native, co-occurring oaks.

8.02	<p>1. Iida (1996) Quantitative analysis of acorn transportation by rodents using magnetic locator. <i>Vegetatio</i> 124:39-43. 2. PFAF (http://www.pfaf.org [accessed 31 Dec 2014]).</p>	<p>1. Squirrels and other rodents create caches of acorns away from seed source to eat later, when conditions are suitable for growth and seeds are left behind, viable seeds will germinate. In a field experiment, it was determined that the average distance seeds were transported was 22.1+ 8.9m and 3% of acorns survived. 2. Seeds lose viability quickly.</p>
8.03	<p>1. Westbrooks, Thomas, and Lloyd (2010) US Early Detection and Rapid Response System for Invasive Plants Fact Sheet: Sawtooth Oak. (www.ncswma.org/images/Sawtooth_Oak.doc [accessed 31 Dec 2013]). 2. Invasive Plant Alert Sawtooth Oak, Exotic Plant Management Team (www.nps.gov/cue/.../Quercus%20acutissima%202012%20NCREPMT.pdf [accessed 31 Dec 2013])</p>	<p>1. Manually remove or treat with a broad spectrum herbicide such as glyphosate. Larger trees may be cut down or girdled and treated. 2. Foliar spray of seedlings, larger trees cut and paint stump of girdle and treat with glyphosate.</p>
8.04		No evidence
8.05	<p>1. Ohio Department of Natural Resources Div of Forestry: Sawtooth Oak. (http://ohiodnr.com/forestry/trees/oak_sawth/tabid/5396/Default.aspx [accessed 31 Dec 2014]) 2. Gilman and Watson (2006) <i>Quercus acutissima</i>. EDIS Document #ENH-698, Environmental Horticulture, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. (http://edis.ifas.ufl.edu/st540 [accessed 31 Dec 2013]).</p>	<p>1. Sawtooth oak is basically pest free. 2. No pests or diseases of major concern although the list of potential pests/pathogens is long. The tree is usually disease/pest free.</p>