

Assessment date 15 Sept 2015

<i>Humulus lupulus</i> North		Answer	Score
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 Florida's USDA climate zones (0-low; 1-intermediate; 2-high) North Zone: suited to Zones 8, 9 Central Zone: suited to Zones 9, 10 South Zone: suited to Zone 10	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	1	
2.03	Broad climate suitability (environmental versatility)	y	1
2.04	Native or naturalized in habitats with periodic inundation North Zone: mean annual precipitation 50-70 inches Central Zone: mean annual precipitation 40-60 inches South Zone: mean annual precipitation 40-60 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	y	2
3.02	Garden/amenity/disturbance weed	y	2
3.03	Weed of agriculture	unk	
3.04	Environmental weed	y	4
3.05	Congeneric weed	y	2
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	n	-1
4.05	Toxic to animals	y	1
4.06	Host for recognised pests and pathogens	unk	0
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	n	0
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	unk	0
4.11	Climbing or smothering growth habit	y	1
4.12	Forms dense thickets	y	1
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	n	-1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative propagation	y	1
6.07	Minimum generative time (years)	3	0
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y	1
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	n	-1
7.04	Propagules adapted to wind dispersal	unk	-1
7.05	Propagules water dispersed	unk	-1
7.06	Propagules bird dispersed	unk	-1
7.07	Propagules dispersed by other animals (externally)	unk	-1
7.08	Propagules dispersed by other animals (internally)	unk	-1
8.01	Prolific seed production	unk	-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	unk	-1
8.05		y	-1
Total Score		6	
Implemented Pacific Second Screening		yes	
Risk Assessment Results		Low	

section	# questions answered	satisfy minimum?
A		10 yes
B		8 yes
C		15 yes
total		33 yes

Assessment date 15 Sept 2015

<i>Humulus lupulus</i> Central/South		Answer	Score
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 Florida's USDA climate zones (0-low; 1-intermediate; 2-high) North Zone: suited to Zones 8, 9 Central Zone: suited to Zones 9, 10 South Zone: suited to Zone 10	0	
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 in habitats with periodic inundation North Zone: mean annual precipitation 50-70 inches Central Zone: mean annual precipitation 40-60 inches South Zone: mean annual precipitation 40-60 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	y	1
3.02	Garden/amenity/disturbance weed	y	1
3.03	Weed of agriculture	unk	
3.04	Environmental weed	y	1
3.05	Congeneric weed	y	1
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	n	-1
4.05	Toxic to animals	y	1
4.06	Host for recognised pests and pathogens	unk	0
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	n	0
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	unk	0
4.11	Climbing or smothering growth habit	y	1
4.12	Forms dense thickets	y	1
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	n	-1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative propagation	y	1
6.07	Minimum generative time (years)	3	0
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y	1
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	n	-1
7.04	Propagules adapted to wind dispersal	unk	-1
7.05	Propagules water dispersed	unk	-1
7.06	Propagules bird dispersed	unk	-1
7.07	Propagules dispersed by other animals (externally)	unk	-1
7.08	Propagules dispersed by other animals (internally)	unk	-1
8.01	Prolific seed production	unk	-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	unk	-1
8.05		y	-1
Total Score		0	
Implemented Pacific Second Screening		no	
Risk Assessment Results		Low	

section	# questions answered	satisfy minimum?
A		10 yes
B		8 yes
C		15 yes
total		33 yes

	Reference	Source data
1.01	1. University of Minnesota. http://conservancy.umn.edu/bitstream/handle/11299/159210/Havill.pdf?sequence=1 (Accessed: 13 September 2015)	1. "Cultivation of hops began approximately 1200 years ago in central Europe and has progressed quite rapidly in the past 100 years." --- However, there is no evidence of selection for reduced weediness.
1.02		Skip to 2.01
1.03		Skip to 2.01
2.01	1. Missouri Botanical Garden. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j440 (Accessed: 10 September 2015) 2. Dave's Garden. http://davesgarden.com/guides/pf/go/1115/#b (Accessed: 11 September 2015) 3. USDA Germplasm Resources Information Network. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19415 (Accessed: 11 September 2015) 4. PERAL NAPPFAST Global Plant Hardiness. http://www.nappfast.org/Plant_hardiness/2012/PHZ%20update201230%20yr%20%20300dpi.tif (Accessed 11 September 2015)	No computer analysis was performed. 1&2. "Zone: 3 to 8" 3. Native to Africa (Morocco), Asia (Israel, Lebanon, Syria, Turkey, Armenia, Azerbaijan, Georgia, Russian Federation, Kyrgyzstan, China, Japan), Europe (Denmark, Finland, Norway, Sweden, United Kingdom, Austria, Belgium, Czech Republic, Hungary, Netherlands, Poland, Slovakia, Switzerland, Belarus, Ukraine, Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Italy, Macedonia, Montenegro, Romania, Serbia, Slovenia, France, Portugal, Spain), and Northern America (Canada, United States, Mexico). 4. Florida North Zone: Hardiness zones 8 and 9. Central Zone: Hardiness zones 9 and 10. South Zone: Hardiness zone 10.
2.02		Native range is well known. Zones 3 to 8 do not extend into the Central or South Zones. Refer to 2.01 source data.
2.03	1. USDA Germplasm Resources Information Network. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19415 (Accessed: 11 September 2015) 2. The University of Melbourne. Köppen-Geiger Climate Map of the World. http://people.eng.unimelb.edu.au/mpeel/koppen.html (Accessed: 11 September 2015)	1. Native to Africa (Morocco), Asia (Israel, Lebanon, Syria, Turkey, Armenia, Azerbaijan, Georgia, Russian Federation, Kyrgyzstan, China, Japan), Europe (Denmark, Finland, Norway, Sweden, United Kingdom, Austria, Belgium, Czech Republic, Hungary, Netherlands, Poland, Slovakia, Switzerland, Belarus, Ukraine, Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Italy, Macedonia, Montenegro, Romania, Serbia, Slovenia, France, Portugal, Spain), and Northern America (Canada, United States, Mexico). 2. Present in the following Köppen-Geiger Climate Zones: BWh, BWk, BSh, BSk, Csa, Csb, Cfa, Cfb, Dsa, Dsb, Dfa, Dfb, and Dfc.
2.04	1. USDA Germplasm Resources Information Network. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19415 (Accessed: 11 September 2015) 2. Climate Charts. World Climate Maps. http://www.climate-charts.com/World-Climate-Maps.html#rain (Accessed: 11 September 2015)	1. Native to Africa (Morocco), Asia (Israel, Lebanon, Syria, Turkey, Armenia, Azerbaijan, Georgia, Russian Federation, Kyrgyzstan, China, Japan), Europe (Denmark, Finland, Norway, Sweden, United Kingdom, Austria, Belgium, Czech Republic, Hungary, Netherlands, Poland, Slovakia, Switzerland, Belarus, Ukraine, Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Italy, Macedonia, Montenegro, Romania, Serbia, Slovenia, France, Portugal, Spain), and Northern America (Canada, United States, Mexico). 2. Native to areas with rainfall in these ranges.
2.05	1. USDA Germplasm Resources Information Network. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19415 (Accessed: 11 September 2015) 2. USDA Germplasm Resources Information Network. http://www.ars-grin.gov/cor/humulus/huminfo.html (Accessed: 13 September 2015)	1. "Widely Naturalized"; "Widely Cultivated" 2. "All commercial hops are of the species <i>Humulus lupulus</i> . Most cultivars were originally derived from European-type hops, although North American germplasm appears in the pedigree of some cultivars"; "English settlers introduced hops into the Southern Hemisphere in South Africa, New Zealand and Australia in the early 1800s. As the popularity of hopped beer and ales spread, the Japanese began cultivating American and German hop varieties around 1876."; "Many other countries in lower latitudes, including Mexico, Kenya and Burma, to name only a few, have attempted to grow hops, generally without success."

3.01	<p>1. Missouri Botanical Garden. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j440 (Accessed: 10 September 2015)</p> <p>2. USDA Germplasm Resources Information Network. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19415 (Accessed: 11 September 2015)</p>	<p>1. "This vine is native to Europe, southwestern Asia and North America. Hops grown commercially in the U. S. are the European variety which has now escaped cultivation and naturalized in many areas." 2. Naturalized: Ireland</p>
3.02	<p>1. Missouri Botanical Garden. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j440 (Accessed: 10 September 2015)</p> <p>2. Plants for a Future. http://www.pfaf.org/user/plant.aspx?LatinName=Humulus+lupulus (Accessed: 10 September 2015)</p> <p>3. Illinois Wildflowers. http://www.illinoiswildflowers.info/savanna/plants/am_hops.htm (Accessed: 10 September 2015)</p> <p>4. Global Compendium of Weeds. http://www.hear.org/gcw/species/humulus_lupulus/ (Accessed: 13 September 2015)</p>	<p>1. "Good screen that will rapidly cover unattractive structures." 2. "Hedgerows, woodlands and sunny waste ground[7]." 3. "American Hops occurs in openings of both upland and floodplain forests, woodland borders, thickets, and slopes of bluffs. In more developed areas, it is found along fence rows, vacant lots, areas along railroads, and miscellaneous waste areas. This plant favors areas that are more or less disturbed, whether from human activities or natural causes. It often clambers over surrounding vegetation, including shrubs and small trees." 4. "Status: garden thug"</p>
3.03	<p>1. Global Compendium of Weeds. http://www.hear.org/gcw/species/humulus_lupulus/ (Accessed: 13 September 2015)</p>	<p>1. "Status: agricultural weed" --- insufficient evidence</p>
3.04	<p>1. Missouri Botanical Garden. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j440 (Accessed: 10 September 2015)</p> <p>2. Plants for a Future. http://www.pfaf.org/user/plant.aspx?LatinName=Humulus+lupulus (Accessed: 10 September 2015)</p> <p>3. Illinois Wildflowers. http://www.illinoiswildflowers.info/savanna/plants/am_hops.htm (Accessed: 10 September 2015)</p> <p>4. Global Compendium of Weeds. http://www.hear.org/gcw/species/humulus_lupulus/ (Accessed: 13 September 2015)</p>	<p>1. "Good screen that will rapidly cover unattractive structures." 2. "Hedgerows, woodlands and sunny waste ground[7]." 3. "American Hops occurs in openings of both upland and floodplain forests, woodland borders, thickets, and slopes of bluffs. In more developed areas, it is found along fence rows, vacant lots, areas along railroads, and miscellaneous waste areas. This plant favors areas that are more or less disturbed, whether from human activities or natural causes. It often clambers over surrounding vegetation, including shrubs and small trees." 4. "Status: Environmental weed"</p>
3.05	<p>1. Global Compendium of Weeds. http://www.hear.org/gcw/scientificnames/scinameh.htm (Accessed: 13 September 2015)</p>	<p>1. Humulus japonicus listed as an agricultural weed, environmental weed, and noxious weed. Humulus scandens listed as an agricultural weed.</p>
4.01	<p>1. Missouri Botanical Garden. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j440 (Accessed: 10 September 2015)</p> <p>2. Plants for a Future. http://www.pfaf.org/user/plant.aspx?LatinName=Humulus+lupulus (Accessed: 10 September 2015)</p> <p>3. Illinois Wildflowers. http://www.illinoiswildflowers.info/savanna/plants/am_hops.htm (Accessed: 11 September 2015)</p>	<p>1,2,&3. These features are not listed in the descriptions of this plant.</p>

4.02	<p>1. Managing Energy, Nutrients, and Pests in Organic Field Crops. https://books.google.com/books?id=3p6NagAAQBAJ&pg=PA207&lpg=PA207&dq=%22Humulus+lupulus%22+allelopathy&source=bl&ots=oLaCf_jPVS&sig=ad7RCnq6M_Y1NHyKF-XtnDPVP-o&hl=en&sa=X&ved=0CEMQ6AEwCWovChMlovS6_Nj1xwIVhaqACh0m2gMF#v=onepage&q=%22Humulus%20lupulus%22%20allelopathy&f=false (Accessed: 13 September 2015) 2. Allelopathy: Current Trends and Future Applications. https://books.google.com/books?id=m0I5opQX2dMC&pg=PA302&lpg=PA302&dq=%22Humulus+lupulus%22+allelopathy+antifungal&source=bl&ots=A2F0-4Bx8H&sig=Cav1VPbLv__MYpkDdS99hYCiBWw&hl=en&sa=X&ved=0CB4Q6AEwAGovChMImOXUi732xwIVyo4NCh32cgbb#v=onepage&q=%22Humulus%20lupulus%22%20allelopathy%20antifungal&f=false (Accessed: 13 September 2015)</p>	<p>1. "Dose-response relationships for the antifeedant effects of <i>Humulus lupulus</i> extracts against larvae and adults of the Colorado potato beetle." 2. "Aqueous extracts of <i>Laurus nobilis</i>, <i>Humulus lupulus</i>, <i>Cirsium arvense</i> and <i>Salvia officinalis</i> exhibited significant antifungal activity against <i>Alternaria solani</i>, the cause of early blight of potato" --- No evidence of allelopathy not involving the use of a concentrated aqueous solution in a laboratory setting.</p>
4.03		No evidence
4.04	<p>1. Pet Poison Helpline. http://www.petpoisonhelpline.com/poison/hops/ (Accessed: 11 September 2015) 2. Purdue Horticulture. https://www.hort.purdue.edu/newcrop/duke_energy/Humulus_lupulus.html (Accessed: 11 September 2015) 3. Small Scale and Organic Hops Production. http://www.crannogales.com/HopsManual.pdf (Accessed: 13 September 2015)</p>	<p>1. "Poisonous to: Cats, Dogs, Level of Toxicity: Generally mild to severe, depending on the amount ingested"; can result in death 2. "Conventionally, the spent hops are often used as fodder or manure." 3. "Both sheep and chickens can be rotationally grazed in the hopyard."</p>
4.05	<p>1. Pet Poison Helpline. http://www.petpoisonhelpline.com/poison/hops/ (Accessed: 11 September 2015) 2. Purdue Horticulture. https://www.hort.purdue.edu/newcrop/duke_energy/Humulus_lupulus.html (Accessed: 11 September 2015)</p>	<p>1. "Poisonous to: Cats, Dogs, Level of Toxicity: Generally mild to severe, depending on the amount ingested"; can result in death 2. "Conventionally, the spent hops are often used as fodder or manure."</p>
4.06	<p>1. UF IFAS EDIS. http://edis.ifas.ufl.edu/ep488 (Accessed: 11 September 2015) 2. CABI. http://www.cabi.org/ISC/abstract/19991111328 (Accessed: 14 September 2015) 3. University of Minnesota. http://conservancy.umn.edu/bitstream/handle/11299/159210/Havill.pdf?sequence=1 (Accessed: 14 September 2015)</p>	<p>1. "Pests/Disease: The following can affect production of hops: mites (<i>Tetranychus urticae</i>), downy mildew (<i>Pseudoperonospora humuli</i>), and powdery mildew (<i>Sphaerotheca humuli</i>) (Mahaffee and Pethybridge 2009)." 2. "Of 5 species of insect pests recorded from hops in the Lahaul Valley of Himachal Pradesh, India, <i>Vanessa cashmirensis</i> was the most important, with infestation levels of 4-30%, followed by <i>V. cardui</i> (2-22%) and <i>Apoderes</i> [<i>Apoderus</i>] sp. (2-20%). Infestation by <i>Agrotis ipsilon</i> and <i>A. segetum</i> remained at 5-7%." 3. "Also of concern to growers are factors such as powdery mildew (<i>Podosphaera macularis</i>) and a foliar pest, the two-spotted spider mite (<i>Tetranychus urticae</i> Koch.). Presence of either within a production environment can result in detriment to the health of the plant, quality and yield (Neve 1991)." --- No evidence that this plant is a significant primary or alternate host.</p>

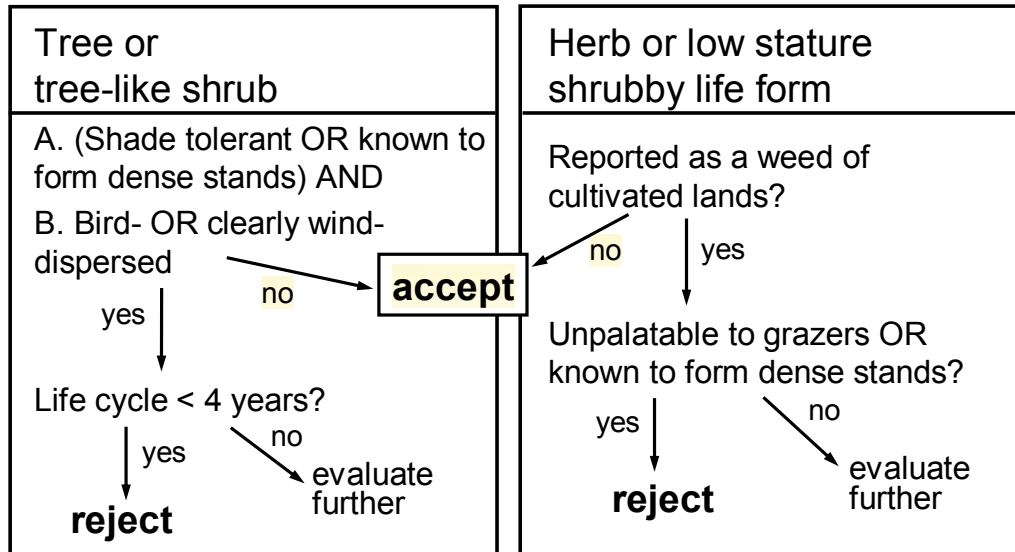
4.07	<p>1. Plants for a Future. http://www.pfaf.org/user/plant.aspx?LatinName=Humulus+lupulus (Accessed: 10 September 2015) 2. Dave's Garden. http://davesgarden.com/guides/pf/go/1115/#b (Accessed: 11 September 2015) 3. Illinois Wildflowers. http://www.illinoiswildflowers.info/savanna/plants/am_hops.htm (Accessed: 10 September 2015)</p>	<p>1. "Skin contact with the plant causes dermatitis in sensitive people[222]. Hops dermatitis has long been recognized. Not only hands and face, but legs have suffered purpuric eruptions due to hop picking. Although only 1 in 3,000 workers is estimated to be treated, one in 30 are believed to suffer dermatitis[269]. Dislodged hairs from the plant can irritate the eyes[222]. Sedative effect may worsen depression. Avoid during pregnancy (due to antispasmodic action on uterus). Avoid with breast, uterine and cervical cancers [301]." 2. "Danger: Handling plant may cause skin irritation or allergic reaction, Pollen may cause allergic reaction" 3. "the wind-dispersed pollen may cause allergic reactions in some people"</p>
4.08		No evidence
4.09	<p>1. Missouri Botanical Garden. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j440 (Accessed: 10 September 2015) 2. Illinois Wildflowers. http://www.illinoiswildflowers.info/savanna/plants/am_hops.htm (Accessed: 10 September 2015)</p>	<p>1. "Sun: Full sun to part shade" 2. "Cultivation: The preference is partial or full sun, fertile soil, and moist to slightly dry conditions. This robust vine will also grow in poor soil that is rocky or gravelly."</p>
4.10	<p>1. Missouri Botanical Garden. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j440 (Accessed: 10 September 2015) 2. Illinois Wildflowers. http://www.illinoiswildflowers.info/savanna/plants/am_hops.htm (Accessed: 10 September 2015)</p>	<p>1. "Prefers moist, rich soils, but has some tolerance for drought." 2. "Cultivation: The preference is partial or full sun, fertile soil, and moist to slightly dry conditions. This robust vine will also grow in poor soil that is rocky or gravelly." --- insufficient evidence</p>
4.11	<p>1. Missouri Botanical Garden. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j440 (Accessed: 10 September 2015) 2. Illinois Wildflowers. http://www.illinoiswildflowers.info/savanna/plants/am_hops.htm (Accessed: 11 September 2015) 3. Dave's Garden. http://davesgarden.com/guides/pf/go/1115/#b (Accessed: 11 September 2015)</p>	<p>1. "Needs a support structure on which to climb."; "Good screen that will rapidly cover unattractive structures." 2. "It often clambers over surrounding vegetation, including shrubs and small trees." 3. "Category: Vines and Climbers"</p>
4.12	<p>1. Illinois Wildflowers. http://www.illinoiswildflowers.info/savanna/plants/am_hops.htm (Accessed: 11 Septmeber 2015) 2. Go Botany. https://gobotany.newenglandwild.org/species/humulus/lupulus/ (Accessed: 13 September 2015) 3. University of Michigan. http://www-personal.umich.edu/~rburnham/SpeciesAccountspdfs/HumulupucANNFINAL.pdf (Accessed: 13 September 2015)</p>	<p>1. "American Hops occurs in openings of both upland and floodplain forests, woodland borders, thickets, and slopes of bluffs." 2. "Anthropogenic (man-made or disturbed habitats), floodplain (river or stream floodplains), forests, shrublands or thickets" 3. "Habitat Preference: "Species is distributed in fertile, open and waste ground, fencerows; shaded thickets and wooded slopes on bluffs or at bluff bases, along railroads, floodplains; weedy semishade"</p>
5.01	<p>1. Go Botany. https://gobotany.newenglandwild.org/species/humulus/lupulus/ (Accessed: 13 September 2015)</p>	<p>1. "Habitat: terrestrial"</p>
5.02	<p>1. USDA Plants Database. http://plants.usda.gov/core/profile?symbol=HULU (Accessed: 13 September 2015)</p>	<p>1. "Growth habit: Forb/herb, Vine"</p>
5.03	<p>1. IFAS EDIS. http://edis.ifas.ufl.edu/ep488 (Accessed: 13 September 2015)</p>	<p>1. "Hops (<i>Humulus lupulus</i>) are perennial, herbaceous climbing plants"</p>

5.04	<p>1. Missouri Botanical Garden. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j440 (Accessed: 10 September 2015)</p> <p>2. Plants for a Future. http://www.pfaf.org/user/plant.aspx?LatinName=Humulus+lupulus (Accessed: 10 September 2015)</p> <p>3. Illinois Wildflowers. http://www.illinoiswildflowers.info/savanna/plants/am_hops.htm (Accessed: 11 September 2015)</p>	1,2,&3. These specialized organs are not listed in the descriptions of the plant.
6.01		No evidence of substantial reproductive failure
6.02	<p>1. Missouri Botanical Garden. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j440 (Accessed: 10 September 2015)</p> <p>2. Plants for a Future. http://www.pfaf.org/user/plant.aspx?LatinName=Humulus+lupulus (Accessed: 10 September 2015)</p> <p>3. Illinois Wildflowers. http://www.illinoiswildflowers.info/savanna/plants/am_hops.htm (Accessed: 11 September 2015)</p>	1. "Female flowers and subsequent seeds are born in cone-like structures (strobiles)" 2. "Propagation: Seed - sow spring in a cold frame[37]. Germination is fairly quick." 3. "This vine reproduces by reseeding itself."
6.03	<p>1. Logee's Plants for Home and Garden. http://www.logees.com/hops-nugget-humulus-lupulus-hybrid.html (Accessed: 13 September 2015)</p>	1. Hybrid available for sale online. --- However, there is no evidence of naturally occurring hybridization.
6.04	<p>1. Plants for a Future. http://www.pfaf.org/user/plant.aspx?LatinName=Humulus+lupulus (Accessed: 10 September 2015)</p>	1. "Dioecious. Male and female plants must be grown if seed is required."; "The plant is not self-fertile."
6.05	<p>1. Missouri Botanical Garden. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j440 (Accessed: 10 September 2015)</p> <p>2. Illinois Wildflowers. http://www.illinoiswildflowers.info/savanna/plants/am_hops.htm (Accessed: 10 September 2015)</p>	1. "Flowers emit a pine-like fragrance and are attractive to butterflies." 2. "Pollination is by wind, rather than insects. However, the abundant pollen of the staminate flowers attracts flower flies (Syrphidae) and small bees."
6.06	<p>1. Purdue Horticulture. https://www.hort.purdue.edu/newcrop/duke_energy/Humulus_lupulus.html (Accessed: 11 September 2015)</p> <p>2. USDA Germplasm Resources Information Network. http://www.ars-grin.gov/cor/humulus/huminfo.html (Accessed: 14 September 2015)</p> <p>3. The University of Vermont. http://www.uvm.edu/extension/cropsoil/wp-content/uploads/jason-presentation.pdf (Accessed: 14 September 2015)</p>	1. "More frequently propagation from layering or cuttings from established stocks each place." 2. "Because H. lupulus is dioecious, it is highly heterozygous; therefore, seedling populations are highly variable. Even seeds collected from a superb variety will fail to produce a plant with the brewing value of its mother plant. For this reason, commercial plant material is propagated vegetatively either from rhizomes or softwood cuttings. Rhizomes, or underground shoots, have several buds at each node and can be pruned from the crown of the mother plant, cut into pieces, and planted in either the field or greenhouse. Softwood cuttings are taken from the stem, with each piece including one node with two leaves and about 5 to 8 cm of stem below the node." 3. "The plant also produces The plant also produces produces rhizomes (below ground stems). Buds become new spring growth. Easily propagated from cuttings."
6.07	<p>1. Voss Farm. http://www.quirkyhomebrew.com/PDFs/Voss%20Farms%20Hop%20Growing.pdf (Accessed: 13 September 2015)</p>	1. "A Hop plant will reach maturity in about 3 years"
7.01	<p>1. Illinois Wildflowers. http://www.illinoiswildflowers.info/savanna/plants/am_hops.htm (Accessed: 11 September 2015)</p>	1. "American Hops occurs in openings of both upland and floodplain forests, woodland borders, thickets, and slopes of bluffs. In more developed areas, it is found along fence rows, vacant lots, areas along railroads, and miscellaneous waste areas. This plant favors areas that are more or less disturbed, whether from human activities or natural causes."

7.02	1. Missouri Botanical Garden. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j440 (Accessed: 11 September 2015) 2. Plants for a Future. http://www.pfaf.org/user/plant.aspx?LatinName=Humulus+lupulus (Accessed: 11 September 2015) 3. Dave's Garden. http://davesgarden.com/products/ps/go/1115/ (Accessed: 11 September 2015)	1. "Good foliage vine for trellises and arbors. Incorporate into an herb garden. Good screen that will rapidly cover unattractive structures." 2. Has edible uses, medicinal uses, and other uses 3. Listed as for sale with at least three vendors in the United States.
7.03		No evidence
7.04	1. University of Michigan. http://www-personal.umich.edu/~rburnham/SpeciesAccountspdfs/HumulupubCANNFINAL.pdf (Accessed: 13 September 2015)	1. "The small, light achenes suggest dispersal by mechanical means (i.e. – strong wind or water currents)." --- insufficient evidence
7.05	1. University of Michigan. http://www-personal.umich.edu/~rburnham/SpeciesAccountspdfs/HumulupubCANNFINAL.pdf (Accessed: 13 September 2015)	1. "The small, light achenes suggest dispersal by mechanical means (i.e. – strong wind or water currents)." Strobiles float, but unknown if individuals seeds are buoyant. --- insufficient evidence
7.06		No evidence
7.07		No evidence
7.08		No evidence. Consumed, but unknown whether the seed remains viable after passage through the gut.
8.01		No evidence
8.02		No evidence
8.03	1. Invasive.org. http://www.invasive.org/browse/detail.cfm?imgnum=5393322 (Accessed: 13 September 2015) 2. Cornell Cooperative Extension. http://madisoncountycce.org/agriculture/hops-program/growing-hops-at-home (Accessed: 14 September 2015)	1. Photographic evidence of damage occurring to a hop plant due to herbicide application. 2. "Hops are sensitive to herbicides like glyphosate and 2, 4 D so be careful not to let these drift onto the hop leaves or stems."
8.04		No evidence
8.05	1. International Journal of Pest Management. http://www.nhm.ac.uk/resources/research-curation/projects/chalcidoids/pdf_Y/GrasswJa2011.pdf (Accessed: 14 September 2015)	1. "Hypena humuli was first reported as a pest of hops in eastern USA in the late nineteenth and early twentieth centuries (Howard 1897; Hawley 1918). Since then, the USA hop industry has become concentrated in three northwestern states (Washington, Oregon and Idaho), with approximately 75% of commercial hops being produced in Washington State's Yakima valley (Anon 2008). Only in the latter area is H. humuli considered to be a pest, and even there it has historically been regarded to be a relatively minor and sporadic problem. However, in recent years, it has become a more frequent and damaging pest, probably as a result of the gradual shift away from broadspectrum organophosphate compounds for the routine control of key hop pests such as hop aphid (Phorodon humuli Schrank) and two-spotted spider mite (Tetranych usurticae Koch) to more selective products that provide no concomitant control of hop loopers. High densities of H. humuli larvae can defoliate the crop and damage developing flowers ("cones")."

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

(from Daehler *et al.* 2004)



Vines must pass both tests