

**Plant Propagation Protocol for *Celtis laevigata* Willd. var. *reticulata* (Torr.) L.D. Benson/
ESRM 412 – Native Plant Production**



Celtis laevigata in eastern Washington
<http://web.ewu.edu/ewflora/Ulmaceae/Celtis%20reticulata.html>

TAXONOMY	
Family Names	
Family Scientific Name:	Ulmaceae
Family Common Name:	Elm
Scientific Names	
Genus:	<i>Celtis</i>
Species:	<i>laevigata</i>
Species Authority:	Willd.
Variety:	<i>reticulata</i>
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	(Torr.) L.D. Benson
Common Synonym(s):	<i>Celtis douglasii</i> Planch. <i>Celtis occidentalis</i> L. var. <i>reticulata</i> (Torr.) Sarg. <i>Celtis reticulata</i> Torr. <i>Celtis reticulata</i> Torr. var. <i>vestita</i> Sarg.
Common Name(s):	Netleaf hackberry
Species Code (as per USDA Plants database):	CELAR

GENERAL INFORMATION

Geographical range (distribution maps for North America and Washington state)

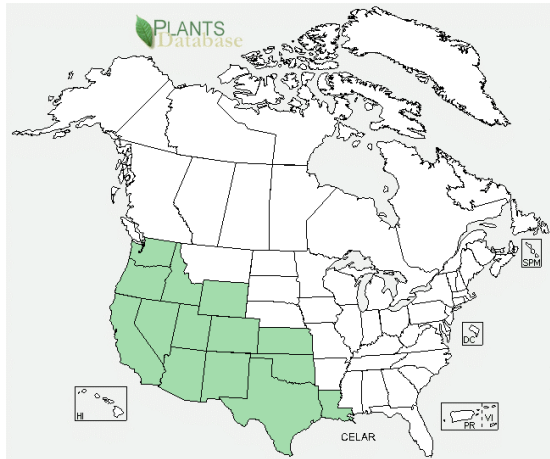


Image from <http://plants.usda.gov>

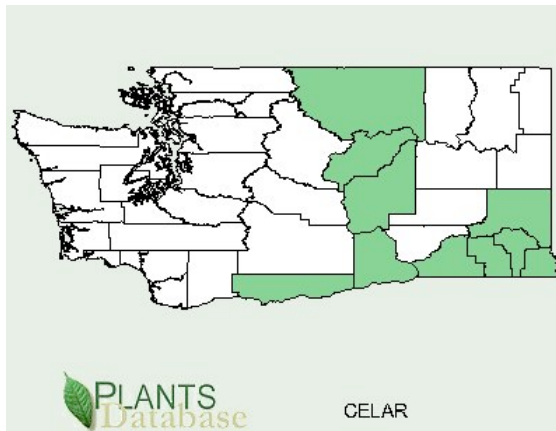


Image from <http://plants.usda.gov>

Ecological distribution (ecosystems it occurs in, etc):

The native range of netleaf hackberry is wide but fragmented, especially in Washington, Oregon, and Idaho.¹⁰ It grows throughout the western United States and east to Texas and Oklahoma.¹⁰ The taxonomy of *Celtis laevigata* is confused because the species is highly variable. Other varieties, commonly called sugarberry, are distributed throughout the southeastern United States.² In the southeast, the tree grows in moist bottomlands but in more arid environments, it grows over calcareous rock.³

Climate and elevation range

Moist or arid regions, at elevations up to 2,000 feet.⁴ Netleaf hackberry is drought tolerant and prefers a lot of sunlight. It can grow in areas with high temperatures of up to 110° F.⁵

Local habitat and abundance; may include commonly associated species

Scattered, individual growth on open slopes and rocky bluffs in eastern Washington; especially in semi-desert grasslands.¹⁰ It is also very abundant as a dominant and codominant species in mixed forests along current and past river courses, such as the Snake River.^{1,5} Commonly associated with oak, juniper, Joshua tree and sagebrush.^{5,10}

Plant strategy type/ successional stage:

Reticulata is a dominant or codominant species in mixed woodlands. Associated codominant tree species include live *Quercus virginiana*, *Ulmus crassifolia*,

	<i>Bromus tectorum</i> , <i>Pseudoroegneria spicata</i> , and <i>Sporobolus cryptandrus</i> . The tree can establish in newly disturbed sites and can also be a member of a climax community under favorable conditions. ⁵ In Idaho, along the Wiley reach of the middle Snake River, netleaf hackberry forms nearly pure stands with a dense, closed canopy. ¹⁰
Plant characteristics:	Netleaf hackberry is a fairly long-lived, slow-growing, perennial, monoecious tree. ^{2,10} When mature, it reaches heights between 4-10 m. The bark is reddish-gray, thick and warty. ⁵ The leaves are alternate, ovate, serrate, light green and between 3-10 cm long. ¹ The fruit is drupe and reddish-brown to purple. ¹ The fruit can also be white. ² The small, green flowers are inconspicuous. The tree is one of the hardiest to grow in its range; it can withstand fire, harsh growing conditions, and degraded growth habitat. ¹⁰
PROPAGATION DETAILS	
Ecotype:	
Propagation Goal:	Plants
Propagation Method:	Seed
Product Type:	Container
Stock Type:	Wild, local seed should be used for propagation because the range of adaptability for hackberry populations is unknown. ¹⁰
Time to Grow:	At least one year for successful outplanting. ¹⁰
Target Specifications:	Mature tree
Propagule Collection:	Fruits should be picked from late summer to winter. ⁶
Propagule Processing/Propagule Characteristics:	The fruits can either be air-dried with the pulp intact or soaked overnight and the pulp rubbed off. Seeds should be stored over winter in sealed containers and then refrigerated. ⁶ Seeds will remain viable in these controlled conditions for several years. ⁵ Cleaned seeds average 4,870/pound. ⁵
Pre-Planting Propagule Treatments:	A 120 day stratification at 41°F breaks seed dormancy and the fruit should be depulped prior to planting to enhance germination (if not done prior to storing). ⁵ Mechanical scarification also enhances germination. ⁹
Growing Area Preparation / Annual Practices for Perennial Crops:	Plant seeds ½ inch deep in a moist, loose, and well-drained bed. ⁶ It is beneficial to mulch the seedbed with straw and leaves. ⁷
Establishment Phase:	Untreated seeds can be sown in the fall or stratified seeds can be sown in the spring and summer. ^{6,7}
Length of Establishment Phase:	If planted directly in the fall, establishment is between 3-5 months. If stratified seeds are planted in the spring or summer, establishment is about 12 weeks. ⁷
Active Growth Phase:	Germination of directly sown seeds occurs in late winter to early spring. ⁵ The first new leaves of <i>reticulata</i> appear between April and May. The plants flower around this same time. The fruits ripen in late summer or early fall and are naturally dispersed throughout the rest of the fall and winter. ⁵
Length of Active	5-6 months

Growth Phase:	
Hardening Phase:	Not found in literature
Length of Hardening Phase:	Not found in literature
Harvesting, Storage and Shipping:	Not found in literature
Length of Storage:	Not found in literature
Guidelines for Outplanting / Performance on Typical Sites:	Seedlings should be outplanted in the spring on south, west, or east-facing aspects. ¹⁰ Moist, loamy, well-drained soils are preferred, close to waterways or streambeds, but far enough away that roots will not be constantly saturated. ^{5,10} Netleaf hackberry naturally grows in a wide variety of soils. It grows well in rocky or gravelly soils, sandy or loamy, and alkaline or acidic. ⁵ Placing rocks around newly planted seedlings will help increase moisture availability and decrease competition with other vegetation. ¹⁰ Seeds are hard and thick-walled, probably the main contributor to the low germination percentage, about 37%. ⁹
Other Comments:	Netleaf hackberry can be useful to manage disturbed sites because it is a good soil stabilizer and is capable of withstanding harsh growing conditions. ^{5,10}
PROPAGATION DETAILS	
Vegetative propagation by root cuttings from Redlin and Herman⁸	
Ecotype:	Cuttings were taken from trees local to North Dakota. Seven experiments were performed with cuttings from trees ages 2, 10, and 75.
Propagation Goal:	Cuttings
Propagation Method:	Vegetative
Product Type:	Container
Stock Type:	Rootstocks
Time to Grow:	Not available
Target Specifications:	Commercially viable mature trees.
Propagule Collection:	270, 5 cm long root cuttings were taken from dormant plants in early spring.
Propagule Processing/Propagule Characteristics:	Not available
Pre-Planting Propagule Treatments:	Of the seven root cutting experiments, cuttings from four were treated with Hormodin, a growth hormone, to the distal 1.25 cm at 0, 1000, 4000, and 8000 ppm. The cuttings from experiments 1, 2, and 3 were left untreated.
Growing Area Preparation / Annual Practices for Perennial Crops:	The medium was a 1:1 ratio of moist sand and peat.
Establishment Phase:	Not available
Length of Establishment Phase:	Not available

Active Growth Phase:	Not available
Length of Active Growth Phase:	Not available
Hardening Phase:	Not available
Length of Hardening Phase:	Not available
Harvesting, Storage and Shipping:	Not available
Length of Storage:	Not available
Guidelines for Outplanting / Performance on Typical Sites:	Root cuttings taken from two-year-old trees produced 70% new plants. Cuttings should be planted with the proximal end 1.3 cm above the surface of the medium. Cuttings planted at this depth were 100% successful. Propagules planted with the proximal end flush to the medium were 50% successful but those with the proximal end planted 1.3 cm below the medium had 0% success. Experimentation with cuttings from different aged trees showed that successful propagation increased as the age of the tree decreased.
Other Comments:	Although cuttings from a variety of ages of hackberry trees were viable, root cuttings taken from two year old seedlings were the most successful form of vegetative propagation. Vegetative propagation in the wild also occurs after a fire or disturbance from the root crown.

INFORMATION SOURCES

References (full citations):	<p>¹Knoke, Don and David Giblin. "<i>Celtis reticulata</i>." <i>WTU Herbarium Image Collection</i>. The Burke Museum of Natural History and Culture, 2011. Web. 11 May 2011. <http://biology.burke.washington.edu/herbarium/imagecollection.php?ID=4481>.</p> <p>²USDA PLANTS database. Web. 11 May 2011. <http://plants.usda.gov>.</p> <p>³Cook, Will. "Sugarberry (<i>Celtis laevigata</i>)." Duke University, 20 March 2011. Web. 12 May 2011. <http://www.duke.edu/~cwcook/trees/cela.html>.</p> <p>⁴"Sugarberry (<i>Celtis laevigata</i>)." <i>Florida Forest Trees</i>. University of Florida School of Forest Resources and Conservation. Web. 12 May 2011. <http://www.sfrc.ufl.edu/4h/sugarberry/sugarber.htm>.</p> <p>⁵Tirmenstein, D.A. "<i>Celtis reticulata</i>." USDA, USFS, Rocky Mountain Research Station, and Fire Sciences Laboratory, 1990. Web. 12 May 2011. <http://www.fs.fed.us/database/feis/plants/tree/celret/all.html>.</p> <p>⁶"<i>Celtis laevigata</i> var. <i>reticulata</i> (Torr.) L. Benson." <i>Lady Bird Johnson Wildflower Center Native Plant Database</i>. The University of Texas at Austin, 20 Feb 2009. Web. 12 May 2011. <http://www.wildflower.org/plants/result.php?id_plant=CELAR>.</p> <p>⁷"<i>Celtis laevigata</i>." <i>Environmental Horticulture</i>. University of Florida, 1 September 2010. Web. 12 May 2011. <http://hort.ufl.edu/database/lppi/sp086.shtml>.</p> <p>⁸Redlin, Scott C. and Dale E. Herman. "Vegetative Propagation of <i>Celtis occidentalis</i> L." North Dakota State University Department of Horticulture and Forestry. Web. 13 May, 2011. <admin.rngr.net/publications/.../vegetative-propagation-of-celtis.../file>.</p>
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	<p>⁹DeBolt, Ann M. "<i>Celtis reticulata</i> Torr." USDA and USFS. Web. 16 May, 2011. <www.fs.fed.us/global/iitf/pdf/shrubs/Celtis%20reticulata.pdf>.</p> <p>¹⁰DeBolt, Ann M. and Bruce McCune. "Is Nettleleaf Hackberry a Viable Rehabilitation Species for Idaho Rangelands?" Bureau of Land Management, Oregon State University Dept. of Botany and Plant Pathology. Web. 17 May, 2011. <www.fs.fed.us/rm/pubs_int/int_gtr315/int_gtr315_305_309.pdf>.</p>
Other Sources Consulted (but that contained no pertinent information) (full citations):	<p>"Sugarberry." Virginia Tech Department of Forest Resources and Environmental Conservation, 2010. Web. 12 May 2011. <http://dendro.cnre.vt.edu/dendrology/syllabus/factsheet.cfm?ID=275>.</p> <p>Evans, Erv. "Trees: <i>Celtis laevigata</i>." North Carolina State University College of Agriculture & Life Sciences. Web. 12 May 2011. <http://www.ces.ncsu.edu/depts/hort/consumer/factsheets/trees-new/celtis_laevigata.html>.</p> <p>"<i>Celtis reticulata</i>." Master Gardeners of the University of Arizona Pima County Cooperative Extension, 16 March, 2006. Web. 15 May, 2011. <http://ag.arizona.edu/pima/gardening/aridplants/Celtis_reticulata.html>.</p> <p>"<i>Celtis reticulata</i> Torrey." <i>Vascular Plants of the Gila Wilderness</i>. Western New Mexico University Department of Natural Sciences. Web. 15 May, 2011. <http://www.wnmu.edu/academic/nspages/gilaflora/celtis_reticulata.html>.</p>
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