

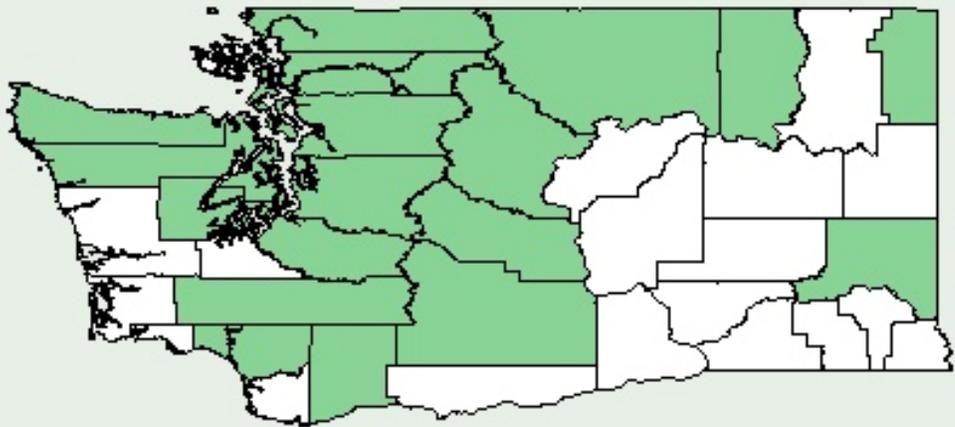
**Plant Propagation Protocol for *Juniperus Communis L.***  
ESRM 412 – Native Plant Production



<http://fwp.mt.gov/content/3163,0,0.jpg>

<b>TAXONOMY</b>	
<b>Family Names</b>	
Family Scientific Name:	Cupressaceae
Family Common Name:	Cypress
<b>Scientific Names</b>	
Genus:	Juniperus
Species:	Communis
Species Authority:	Linnaeus

Cultivar:	<p>Juniperus communis cv. 'Depressa Aurea'</p> <p>Juniperus communis cv. 'Dumosa'</p> <p>Juniperus communis cv. 'Effusa'</p> <p>Juniperus communis cv. 'Prostrata'</p> <p>Juniperus communis cv. 'Repanda'</p> <p>Juniperus communis cv. 'AmiDak'</p>
Common Synonym(s) (include full scientific names (e.g., <i>Elymus glaucus</i> Buckley), including variety or subspecies information)	<p>Juniperus communis spp. Alpina</p> <p>Juniperus communis ssp. nana Willd</p> <p>Juniperus communis var. alpina</p> <p>Juniperus communis f. compressa</p> <p>Juniperus communis subsp. hemisphaerica</p> <p>Juniperus communis var. montana</p> <p>Juniperus communis subsp. nana</p> <p>Juniperus communis f. oblonga</p> <p>Juniperus communis var. sibirica</p> <p>Juniperus communis f. suecica</p> <p>Juniperus communis var. depressa pursh</p> <p>Juniperus communis var. nipponica</p> <p>Juniperus communis var. saxatilis</p> <p>Juniperus communis var. communis</p>
Common Name(s):	Ground juniper, dwarf juniper, mountain common juniper, old field common juniper, prostrate juniper, hackmatack, horse savin
Species:	<p>JUCO6 Juniperus communis L.  <a href="http://plants.usda.gov/java/nameSearch">http://plants.usda.gov/java/nameSearch</a></p> <p>JUNCOM Juniperus communis L.  <a href="http://www.nativeplantnetwork.org/network/view.asp?protocol_id=2777">http://www.nativeplantnetwork.org/network/view.asp?protocol_id=2777</a></p>
<b>GENERAL INFORMATION</b>	
Geographical range	<p>Is known as one of the most widely distributed trees in the world. In North America it is found as a northern shrub beyond the tree limit in western Alaska, Greenland, and Iceland. It is found as far south as the western mountains of Washington, California, Oregon, and New Mexico. It is commonly found throughout the rest of the United States as well, New England states, Carolinas, Illinois, Indiana, Ohio, Minnesota, and Nebraska. (Sudworth 1915) (Adams 2004)</p> <p>In other parts of the world it is found throughout Europe, Northern Asia, and Japan.</p>

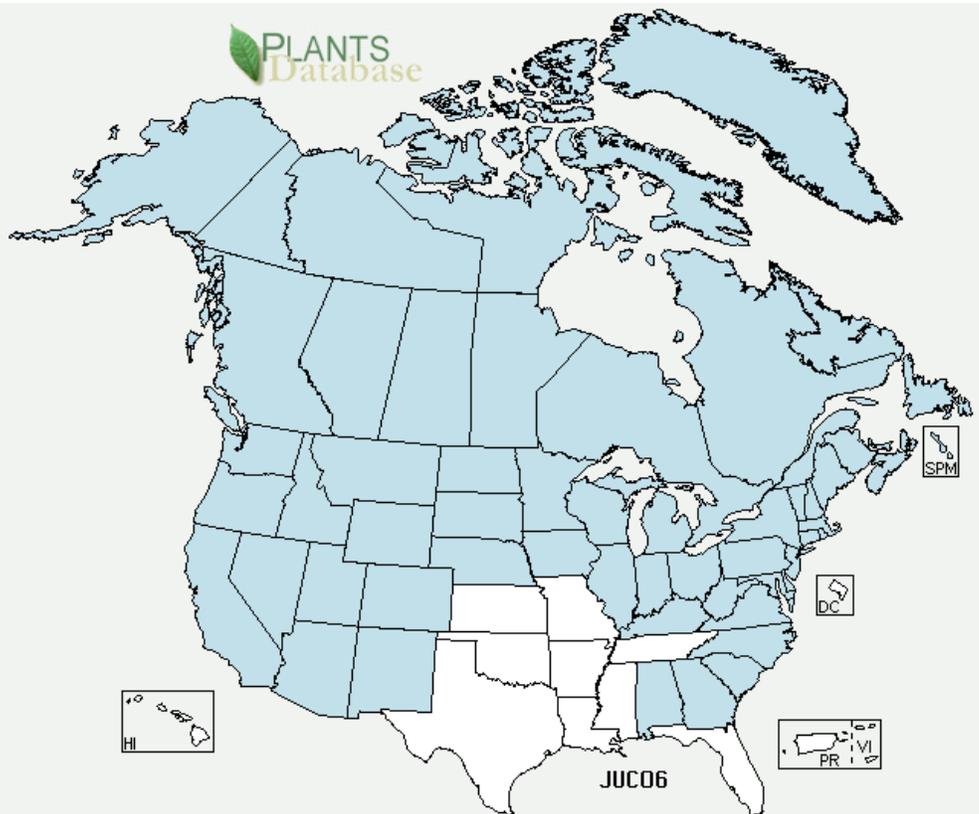


The logo for the PLANTS Database, featuring a green leaf icon to the left of the text "PLANTS Database".

JUC06

Photo:

[http://plants.usda.gov/java/county?state\\_name=Washington&statefips=53&symbol=JUC06](http://plants.usda.gov/java/county?state_name=Washington&statefips=53&symbol=JUC06)



The logo for the PLANTS Database, featuring a green leaf icon to the left of the text "PLANTS Database".

JUC06

	<p>Photo:  <a href="http://plants.usda.gov/java/profile?symbol=JUCO6&amp;mapType=nativity&amp;photoID=juco6_002_ahp.tif">http://plants.usda.gov/java/profile?symbol=JUCO6&amp;mapType=nativity&amp;photoID=juco6_002_ahp.tif</a></p>
Ecological distribution:	Dry, open woods, gravelly ridges, outcrops, and open rocky slopes. (Pojar 2004)
Climate and elevation range	For the United States it can be found from sea level to 2800m. The higher elevations with colder temperatures are the most common areas Juniperus communis can be found. But can be found elsewhere in rare occasions. Worldwide it can be found in lower elevations the farther north it is or the drier the region is. (Adams 2004)
Local habitat and abundance;	It can be found in lowland forests, lowland peat bogs, subalpine ridges, alpine tundra and valleys. (Pojar 2004), wooded hillsides, sand terraces, and exposed plateaus.
Plant strategy type / successional stage	It is shade intolerant, so is usually found in more open areas. It can establish highest abundance in very harsh environments, usually where competition is not present due to the stressful conditions. It has been said to be a seral species when spruces later in life replace it. It is also a colonizer in dunes in Michigan.
Plant characteristics	<p>Evergreen shrub to small tree. The shrub reaches maturity at 7-10 years old. J. Communis is slow growing and has an average lifespan of 100 to 120 years.</p> <p>Common Juniper has needle-like leaves in whorls of three; the leaves are green Juniperus communis is dioecious and for the greatest environmental adaptability seeds are preferred over cuttings. However female cuttings do well but do not have the diversity of seeds.</p> <p>It was found in a trial that seed germination more than doubled when the seeds were cleaned as compared to planting the berries. (Broome 2003)</p> <p>Seeds are advised when propagating. Propagating with parent Junipers that are within a mile of each other and in the same ecotype is recommended or best results. (Broome 2003)</p>

## PROPAGATION DETAILS

- (1) [http://www.nativeplantnetwork.org/network/view.asp?protocol\\_id=66,897](http://www.nativeplantnetwork.org/network/view.asp?protocol_id=66,897)  
 (2) [http://www.nativeplantnetwork.org/network/view.asp?protocol\\_id=2777](http://www.nativeplantnetwork.org/network/view.asp?protocol_id=2777)

Juniperus communis L.

(Procedures are direct citations with some supplementation. Because of discrepancy between the two previous protocols, both are displayed)

Ecotype:	(1) Rock outcroppings, Sun Point, 1600 m elevation, Glacier National Park, Glacier Co., MT. (2) The Firehole and Old Faithful Overlook areas of Yellowstone National Park.
Propagation Goal:	(1)(2) Plants
Propagation Method:	(1)(2) Vegetative
Product Type:	(1)(2) Container (plug)
Stock Type:	(1) 800ml containers (2) 4.5-inch azalea pots
Time to Grow:	(1) 15 months (2) Not specified
Target Specifications (size or characteristics of target plants to be produced):	(1) Height: 7 cm Caliper: 5 mm Root System: firm plug in 800 ml container. (2) Not specified
Propagule Collection (how, when, etc):	(1) Cuttings are collected from healthy field plants in early to mid May. (2) Collect summer cuttings in early August, take 1 and 2yr old wood. Take 6- to 8-inch long cuttings with a basal diameter of at least 0.25 inches. Place cuttings inside a ziplock bag moistened with water, and then store in a portable cooler packed with ice. Store the cooler in a shaded location. Minimize storage time. The cuttings we collected were held in the cooler less than 16 hours before being moved to a walk-in cooler maintained at 34 to 37°F and 80+% relative humidity. Inspect each bag periodically to assure high humidity and re-moisten as necessary. We collect cuttings from numerous individual plants in an attempt to sample to the diversity of the ecotype. Our use of summer cuttings reflects limited access to plants in the winter months in Yellowstone National Park. Cuttings collected at other

	times of the year may propagate as well or better.
<p>Propagule Processing/ Propagule Characteristics</p>	<p>(1) Cuttings are kept moist and under refrigeration prior to pretreatment. It is best to treat cuttings immediately after collection. (2) Not specified</p> <p>(1) Berry-like cones are collected in late fall by handpicking, stripping or shaking the cones from the shrubs on a canvas tarp. Fruit is collected when Berry-like cone has matured to dark blue and is somewhat soft in consistency&gt; The cones should be two years old at this stage and distinguishable from 1 yr old cones, which are covered with a powder blue bloom and are hard in consistency. Seeds/Kg: 80,300/kg. There are usually 1 to 4 seeds per cone. Seeds are brown at maturity. Seed longevity: up to 10 years at 1 to 3C in sealed containers. Seed dormancy is classified as physiological dormancy. Seed Treatments: 48 hour running water rinse; 60 day warm, moist stratification followed by 90 cold, moist stratification. Juniper seed has both physiological and seed coat dormancy, which are often difficult to overcome. The prolonged warm/cold stratification treatment is effective in producing sizable seedlings in 2 years.</p> <p>(Other) density: 56,100 to 120,150 per Kg</p>
<p>Pre-Planting:</p>	<p>(1) Vegetative Propagation Method: Pre-rooting. Type of Cutting: Semi-hardwood stem cuttings Cuttings were recut after collection, with 1/2 of basal leaves removed. This provides some wounding that promotes rooting. Terminal buds are removed and cuttings are treated with 2 minute Domain fungicide bath to remove surface pathogens. Cuttings were treated with 8000 ppm IBA and placed in mist bed with bottom heat set at 21C. Cuttings were 13 cm in length, 5 mm in diameter. Cuttings taken in fall (October to November) or winter (January or February) treated with 3000 to 8000 ppm IBA have been rooted to high percentages by many commercial growers.</p> <p>Rooting of Juniperus communis is considered best after stock plants have been subjected to several hard frosts or freezes. Hand watering rooting medium is preferable to using intermittent mist to avoid fungal development on the needle-like leaves. Rooting %: Semi-hardwood stem cuttings: 26% Hardwood stem cuttings: 17% to 35%</p>

	<p>(2) Trim all cuttings to a 5- to 6-inch length. Remove all buds, leaves, and branches from the basal 2 to 3 in. of each cutting. Remove all fruit, when present, as well. Store the cuttings in moistened paper towels during processing. Recut the base of each cutting at an angle with a sharp knife and wound the basal end of the stem. This is accomplished by holding a knife perpendicular to the stem, flat side of the knife against the round surface of the stem, and then making a slicing cut downward to produce a 1- to 1.5-inch wound just below the cambium. Lightly spray the wound with water from a mist bottle, shake off excess water, and then insert the base into rooting compound. Remove excess hormone by lightly tapping the end of the cutting on the side of a hard surface. Our treatments included 1- or 2-y wood treated with 16,000 ppm IBA or summer hardwood cuttings (3-y or older wood) treated with 2,000 ppm NAA + 40,400 ppm Thiram™ (fungicide). The number of cuttings per treatment ranged from 13 to 59. Rooting ranged from 51% (59 2-y wood cuttings + 16,000 ppm IBA) to 92% (13 summer hardwood cuttings + 2,000 ppm NAA + 40,400 ppm Thiram™). All rooted cuttings in all treatments were surviving at the time of transplanting.</p>
<p>Growing Area:</p>	<p>(1) The outdoor mistbed has automatic intermittent mist that is applied at 6 second intervals every 6 minutes. Too frequent misting will result in leaf and stem rot. Bottom heat is maintained at 21C with heating cables buried 12 cm beneath rooting medium. Rooting medium is 50% perlite and 50% sand. Mistbed is covered with shade cloth during rooting.</p> <p>(2) A 100% coarse perlite propagation media was used in our trial, although any sterile, highly drained media, such as sand or vermiculite, should work equally well. Moisten the media and make holes to receive each cutting. Use hot water heat to maintain the propagation media at 70°F for the first 12 to 16 weeks in the bed (root initiation phase) and then turn it off. We use overhead intermittent mist activated by a Mist-o-matic™ controller. Firm the media around each cutting after sticking to assure good cutting:media contact. Maintain the greenhouse at 70 to 75°F days and 60 to 65°F nights on 14- to 16-hour photoperiods. (Other) Cuttings must be rooted under moist conditions because they take several months to a year to root. Sand is the best rooting medium. Cuttings from female plants may have better rooting potential than those from male plants. Wounding the base can enhance Root production from stem cuttings.</p>
<p>Establishment Phase (from seeding to germination):</p>	<p>(1) Time to Transplant: 12 weeks Cuttings were not misted frequently as this causes needle decay.</p> <p>(2) Cuttings initiate roots within 12 to 16 weeks, and are well rooted after 24</p>

	weeks. This species produces medium to coarse textured roots. Fertigated the cuttings once or twice each week with 150 to 250 ppm of 9-45-15 as soon as budbreak occurs. Because we let these plants remain active in the greenhouse over the winter, we waited until late January to transplant them into pots in a commercial peat-lite mix. The plants were moved to a shade house in May for hardening off and finishing.
Length of Establishment Phase:	(1) 12 weeks (2) 24 weeks
Active Growth Phase (from germination until plants are no longer actively growing):	(1) After cuttings were lifted from the mistbed, they were potted into 800 ml containers. Growing medium used is 6:1:1 milled sphagnum peat, perlite, and vermiculite with Osmocote controlled release fertilizer (13N:13P2O5:13K2O; 8 to 9 month release rate at 21C) and Micromax fertilizer (12%S, 0.1%B, 0.5%Cu, 12%Fe, 2.5%Mn, 0.05%Mo, 1%Zn) at the rate of 5 grams of Osmocote and 2 grams of Micromax per container. Cuttings were irrigated after potting and placed in the shadehouse for 4 weeks. After establishment in the shadehouse, plants were moved to full sun exposure in the outdoor nursery. (2) Not specified
Length of Active Growth Phase:	(1) 16 weeks (2) Not specified
Hardening Phase:	(1) Plants were fertilized with 10-20-20 liquid NPK at 200 ppm during August and September. The Plants were given one final irrigation prior to winterization. (2) Not specified
Length of Hardening Phase:	(1) 4 weeks (2) Not specified
Harvesting, Storage and Shipping (of seedlings):	(1) Total Time to Harvest: 1.3 years for cuttings Harvest Date: September Storage Conditions: Overwinter in outdoor nursery under insulating foam cover and snow. (2) Not specified
Length of Storage:	(1) 5 months (2) Not specified
Guidelines for Outplanting / Performance on Typical Sites:	(1) Not specified (2) Not specified (Other) Seedlings are usually planted as three-year old stock. Space 1-3 m for ground cover. Slow growing. Prune in June if necessary
Other Comments:	This plant is dioecious, which means the female and male plants are separate. Cones are only dispersed every 2 years. Dispersal of cones will occur in

	<p>August thru October of the second season. .  Propagating with parent Junipers that are within a mile of each other and in the same ecotype is recommended for best results.</p> <p>Through most of the literature on <i>J communis</i>, similar recommendations for sustaining genetic diversity while ensuring the plant is adapted to the climate through propagation by seeding is recommended. The two propagation protocols use vegetative cloning because of higher rooting success over seed germination success.</p> <p>Both protocols had some aspects missing and with the already present disparity in protocols it was ill advised to make the two into one protocol.</p>
<b>INFORMATION SOURCES</b>	
References (full citations):	<ol style="list-style-type: none"> <li>(1) Jim Pojar and Andy MacKinnon. <i>Plants Of The Pacific Northwest Coast Washington, Oregon, British Columbia &amp; Alaska</i>. Grand Rapids: Lone Pine, 2004.</li> <li>(2) Adams, Robert P. <i>Junipers of the World: the genus Juniperus</i>. Victoria, BC: Trafford, 2004.</li> <li>(3) Sudworth, George B. <i>The Cypress and Juniper Trees of the Rocky Mountain Region</i>. Washington: Government Printing Office, 1915.</li> <li>(4) <a href="#">Broome, A. Growing Juniper: Propagation and Establishment Practices (2003)</a>,</li> <li>(5) Adams, Robert P. <i>Junipers of the World: the genus Juniperus</i>. Victoria, BC: Trafford, 2004.</li> <li>(6) <a href="http://www.nativeplantnetwork.org/network/view.asp?protocol_id=66,897">http://www.nativeplantnetwork.org/network/view.asp?protocol_id=66,897</a>  Native Plant Nursery NPS Juniper Communis L. Propagation protocol  (direct Citations (1))</li> <li>(7) <a href="http://www.nativeplantnetwork.org/network/view.asp?protocol_id=2777">www.nativeplantnetwork.org/network/view.asp?protocol_id=2777</a>  Mark E. Majerus Juniper Communis L. propagation protocol  (direct Citations (2))</li> <li>(8) <a href="http://www.treesforlife.org.uk/tfl.juniper.html">http://www.treesforlife.org.uk/tfl.juniper.html</a>  Species Profile</li> <li>(9) <a href="http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?20821">http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?20821</a>  taxonomy of plants page</li> <li>(10) <a href="http://www.goert.ca/propagation_guidelines/shrubs/juniperus_communis">http://www.goert.ca/propagation_guidelines/shrubs/juniperus_communis</a>  Propagation Guidelines</li> <li>(11) <a href="http://pfaf.org/database/plants.php?Juniperus+communis">http://pfaf.org/database/plants.php?Juniperus+communis</a>  Fact Page</li> <li>(12) <a href="http://plants.usda.gov/java/profile?symbol=JUCO6&amp;mapType=nativity&amp;photoID=juco6_002_ahp.tif">http://plants.usda.gov/java/profile?symbol=JUCO6&amp;mapType=nativity&amp;photoID=juco6_002_ahp.tif</a>  USDA Database</li> </ol>

Other Sources Consulted:	(1) <a href="http://www.rook.org/earl/bwca/nature/shrubs/juniperuscom.html">http://www.rook.org/earl/bwca/nature/shrubs/juniperuscom.html</a> Fact page
Protocol Author :	Keith Stoner
Date Protocol	Created (05/02/2003) Updated (04/15/2009)

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