

Plant Propagation Protocol for *Juncus alpinoarticulatus*
 ESRM 412 – Native Plant Production

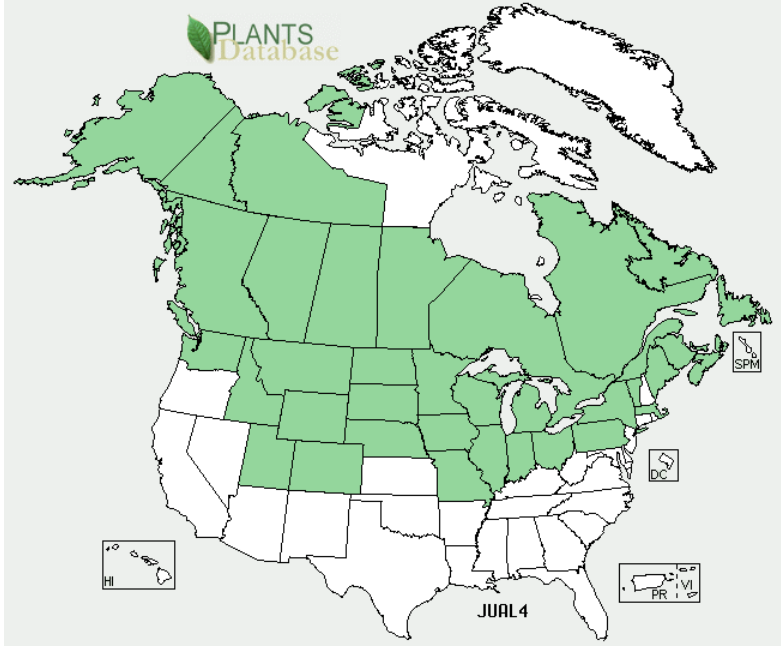


TAXONOMY	
Family Names	
Family Scientific Name:	Juncaceae. ⁽¹⁾
Family Common Name:	Rush family. ⁽¹⁾
Scientific Names	
Genus:	<i>Juncus L.</i> ⁽¹⁾
Species:	<i>Juncus alpinoarticulatus.</i> ⁽¹⁾
Species Authority:	
Variety:	<ul style="list-style-type: none"> • <i>Juncus alpinus Vill. var. americanus</i> ⁽⁵⁾ • <i>Juncus alpinus Vill. var. fuscescens</i> ⁽⁵⁾ • <i>Juncus alpinus Vill. var. insignis</i> ⁽⁵⁾ • <i>Juncus alpinus Vill. var. rariflorus</i> ⁽⁵⁾
Sub-species:	<ul style="list-style-type: none"> • <i>Juncus alpinoarticulatus Chaix subsp. americanus</i> ⁽⁵⁾ • <i>Juncus alpinoarticulatus Chaix subsp. Fuscescens</i> ⁽⁵⁾ • <i>Juncus alpinoarticulatus ssp. nodulosus.</i> ⁽¹⁾
Cultivar:	
Authority for Variety/Sub-species:	<ul style="list-style-type: none"> • <i>Juncus alpinus Vill. var. americanus</i> Farw ⁽⁵⁾ • <i>Juncus alpinus Vill. var. fuscescens</i> Fernald ⁽⁵⁾ • <i>Juncus alpinus Vill. var. insignis</i> Fr. ex Buchenau ⁽⁵⁾

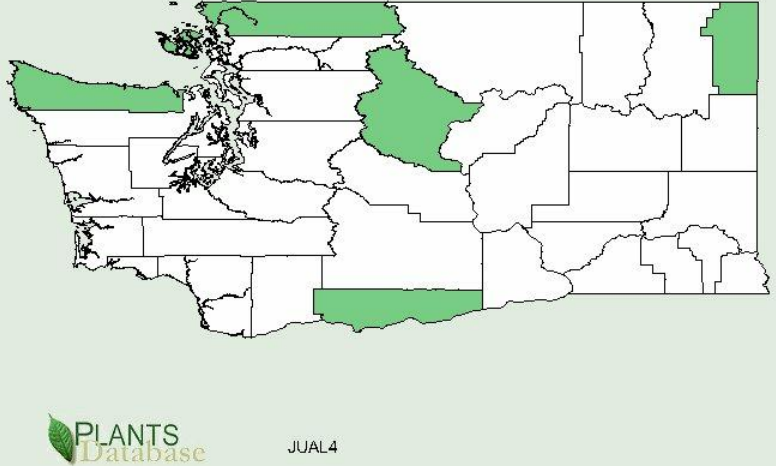
	<ul style="list-style-type: none"> • <i>Juncus alpinus</i> Vill. var. <i>rariflorus</i> (Hartm.) Hartm. ⁽⁵⁾ • <i>Juncus alpinoarticulatus</i> Chaix subsp. <i>americanus</i> (Farw.) Hämet-Ahti ⁽⁵⁾ • <i>Juncus alpinoarticulatus</i> Chaix ssp. <i>nodulosus</i> (Wahlenb.) Hämet-Ahti. ⁽¹⁾ • <i>Juncus alpinoarticulatus</i> Chaix subsp. <i>fuscescens</i> (Fernald) Hämet-Ahti ⁽⁵⁾
Common Synonym(s) (include full scientific names (e.g., <i>Elymus glaucus</i> Buckley), including variety or subspecies information)	<ul style="list-style-type: none"> • <i>Juncus alpinus</i> Vill. ⁽⁵⁾ • Richardson's rush ⁽¹⁾
Common Name(s):	Alpine rush. ⁽²⁾ ; northern green rush. ⁽¹⁾
Species Code (as per USDA Plants database):	JUAL4 ⁽¹⁾

GENERAL INFORMATION

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



(1)

	
<p>Ecological distribution (ecosystems it occurs in, etc):</p>	<ul style="list-style-type: none"> • Wet, open to semi-open situations; in sandy, usually calcareous soil: shores of lakes and ponds, marshes, ditches, wet meadows, and wet areas of abandoned limestone quarries. ⁽⁷⁾ • Wet shores, marshes. [Non-tidal rivershore (non-forested, seasonally wet) ⁽³⁾
<p>Climate and elevation range</p>	<ul style="list-style-type: none"> • Elevation (metres): 1210 ⁽⁶⁾ • Slope Gradient (%): Average = 9.0; Min = 1; Max= 17 ⁽⁶⁾ • Soil Moisture Regime (0- very xeric; 4 – mesic; 8-hydric) ⁽⁶⁾ → Average = 4.0; Min = 3; Max = 5 ⁽⁶⁾ • Climate: has not been evaluated ⁽⁶⁾
<p>Local habitat and abundance; may include commonly associated species</p>	<ul style="list-style-type: none"> • Wet shores, marshes. [Non-tidal rivershore (non-forested, seasonally wet) ⁽³⁾ • A species with a very wide distribution range in Europe, N Asia, Greenland and North America, and NW Africa. The species is very variable and the six subspecies recognized here cover most of the variation range, but further study is needed⁽¹¹⁾
<p>Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)</p>	<p>Hazards: Drainage or other alteration of the wetland habitat; also, overshadowing by woody species as a result of succession. ⁽⁷⁾</p>
<p>Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)</p>	<p>Leaves. ⁽²⁾</p> <ul style="list-style-type: none"> • Located on the lower part of the stem • nearly circular in cross section • tapered • the early leaves stiff • with prominent complete cross-walls; • sheaths open, with short, pointed, ear-shaped lobes.

Flowers⁽²⁾

- Inflorescence terminal
- 3-7 cm long
- the few to several heads cone-shaped
- mostly 3- to 6- (10-) flowered
- the branches few, erect
- perianth segments brown or purplish-brown
- 2-2.5 mm long, generally blunt and rounded but the inner shorter and the outer longer and pointed
- stamens 6
- anthers shorter than the filaments
- involucre bracts usually shorter than the inflorescence

Fruits:⁽²⁾

- Capsules, rounded at the tops
- About as long as the preianth segments or slightly longer
- Seeds spindle-shaped, 0.4 mm long, lacking appendages

Distinct characteristics

“the combination of seeds lacking white appendages (visible with a 10x handlens) and upright branches of the inflorescence”⁽³⁾



(2)

PROPAGATION DETAILS

***IMPORTANT: The propagation methods listed are specifically for *Juncus articulatus*. These are only possible suggestions with a similar species!**

Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from): ⁽¹⁰⁾	
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules): ⁽¹⁰⁾	<ul style="list-style-type: none"> • Height 20 to 25cm (8 - 10 in). • Caliper is not applicable to rushes • Root system must fill container– because of the propagation environment, many roots came out of the bottom of the plug. • The Root Trainer 10 opens up and allows easy extraction of the root system
Propagation Method (Options: Seed or Vegetative):	
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Container (plug) ⁽¹⁰⁾
Stock Type:	Root Trainer 10 (160 cubic centimeters - 10 cubic inch) ⁽¹⁰⁾
Time to Grow (from seeding until plants are ready to be outplanted):	3 months ⁽¹⁰⁾
Target Specifications (size or characteristics of target plants to be produced):	
Propagule Collection (how,	

when, etc):	
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	44,000,000 seeds/kg (97,000,000 seeds/lb) (Hurd and Shaw 1993. Seed was stored in closed-lid jar and placed in a refrigerator at 2 degrees C (35 degrees F). ⁽¹⁰⁾
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	No seed treatments. Do not chill. ⁽⁹⁾
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	Annual Practices for Perennial: Seed was placed in a salt shaker dry and sprinkled over the containers. That rate of spread was similar to a light salting of food. The seed was not covered with grit. Covering with grit will bury the tiny seed and reduce emergence rates. ⁽¹⁰⁾
Establishment Phase (from seeding to germination):	Emergence occurs within 10 days of sowing. Very controlled greenhouse environment for establishment phase. Daily temperatures are kept between 32 to 35C (90 to 95F) and nighttime temperatures 21C (70F). Lights are on all night. Foggers come on when humidity drops below 90% and irrigation by small set sprinklers occurs every hour. After establishment, seedlings are moved out of the greenhouse and placed in cattle troughs and filled with water. Growing period is from June to September. The climate in the Rogue Valley at during this period is very dry and clear. Average daily high in the summer averages 30C (86F) with occasional highs of over 40C (105F). Summer humidity is usually below 30%. ⁽¹⁰⁾
Length of Establishment Phase:	1 month ⁽¹⁰⁾
Active Growth Phase (from germination until plants are no longer actively growing):	After the plants are moved into the cattle troughs, the troughs are filled with water to a level that is approximately one inch lower than the surface of the media. At this time, fertilizer is added to the water by mixing a Excel 21-5-20 into solution and pouring into the tank. We used enough fertilizer to bring the tank up to 100 ppm of nitrogen. We calculated the ppm of nitrogen using the filled volume of water. The trough is filled each after each time the water has drawn down to the bottom of the trough. This occurs three to five times during the growing season and is temperature dependent. ⁽¹⁰⁾
Length of Active	3 months ⁽¹⁰⁾

Growth Phase:	
Hardening Phase (from end of active growth phase to end of growing season; primarily related to the development of cold-hardiness and preparation for winter):	Seedlings were ready by late September, however we did not have enough planters to plant the site so have held them over in the cattle troughs. ⁽¹⁰⁾
Length of Hardening Phase:	Direct outplant ⁽¹⁰⁾
Harvesting, Storage and Shipping (of seedlings):	
Length of Storage (of seedlings, between nursery and outplanting):	
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	
Other Comments (including collection restrictions or guidelines, if available):	

INFORMATION SOURCES

References (full citations):	<p>[1]] USDA Natural Resources Conservation Service http://plants.usda.gov/java/profile?symbol=JUAL4</p> <p>[2] “<i>Juncus alpinoarticulatus</i>”. E-Flora BC: Electronic Atlas of the Plants of British Columbia http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Juncus%20alpinoarticulatus</p> <p>[3] “<i>Juncus alpinoarticulatus</i> Chaix.” Maine.gov: Department of</p>
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	<p>Conservation: Maine Natural Areas Program. http://www.maine.gov/doc/nrimc/mnap/features/junalp.htm [4] “<i>Juncus alpinoarticulatus</i>”. Flora of North America. FNA Vol. 22 Page 254, 255. http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=222000090 [5] “<i>Juncus alpinoarticulatus</i>.” Univeristy of Wisconsin, Stevens Point: Robert W. Freckman Herbarium. http://wisplants.uwsp.edu/scripts/detail.asp?SpCode=JUNALP1 [6] Klinkenberg, Brian. “Developing Ecological Frameworks For BC Vascular Plants: Analyzing BEC Plot Data.” E-Flora BC. 2010. http://www.geog.ubc.ca/biodiversity/eflora/KlinkenbergBECTable.html [7] “<i>Juncus alpinoarticulatus</i>.” Ohio Department of Natural Resources. http://ohiodnr.com/Portals/3/Abstracts/Abstract_pdf/I-J/Juncus_alpinus.pdf [8] USDA Forest Services. <i>Range Plant Handbook</i>. Toronto, Ontario: General Publish Company, Ltd, 1988. [9] Filbert, Marianne, Richter, A., and Robson, Kathleen A. <i>Encyclopedia of Northwest Native Plants for Gardens and Landscapes</i>. Portland: Timber Press Inc., 2007. [10] Native Plant Network. http://www.nativeplantnetwork.org/Network/ViewProtocols.aspx?ProtocolID=747 [11] JUNCACEAE (<i>Juncus</i>) 172. <i>Juncus elliotii</i> Cham., Fl. South. U.S. http://speciesplantarum.net/sites/default/files/floras/j/juncaceae_2_3.pdf</p>
<p>Other Sources Consulted (but that contained no pertinent information) (full citations):</p>	<ul style="list-style-type: none"> • Pojar, Jim and Andy MacKinnon. <i>Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia & Alaska</i>. Vancouver: Lone Line, 1994. • Journal of Vegetation Science 4: (2) 195-202. Feb. cited in Oregon Endangered Species website. • Sanders. T.W.1926. Popular Hardy Perennials, Collingridge • Rice, G. 1988. A Wide Range of Perennial Plants that can be Grown in Britian and How to Grow Them. Volume 2. Thompson and Morgan. • Toogood, Alan (editor). <i>American Horticultural Society: Plant Propagation</i>. New York: DK Publishing, Inc., 1999.
<p>Protocol Author (First and last name):</p>	<p>Sherie Tan</p>
<p>Date Protocol Created or Updated (MM/DD/YY):</p>	<p>05/16/2012</p>

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