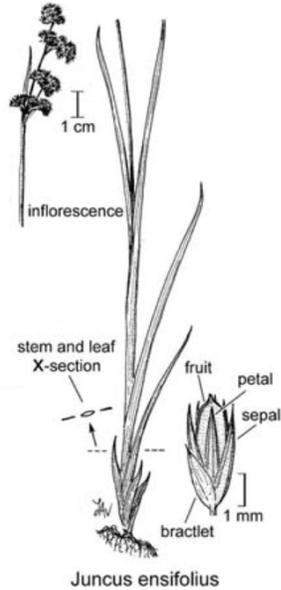


Plant Propagation Protocol for *Juncus ensifolius*

ESRM 412 – Native Plant Production

Protocol URL: <https://courses.washington.edu/esrm412/protocols/JUEN.pdf>



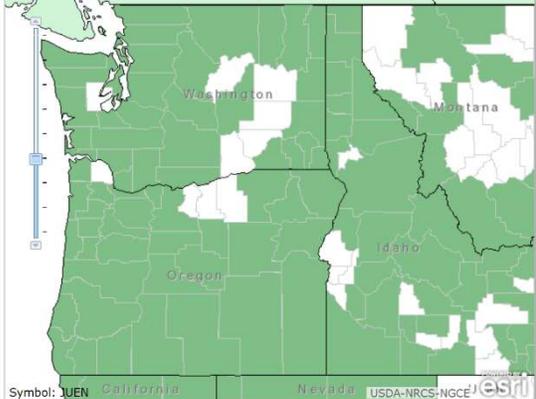
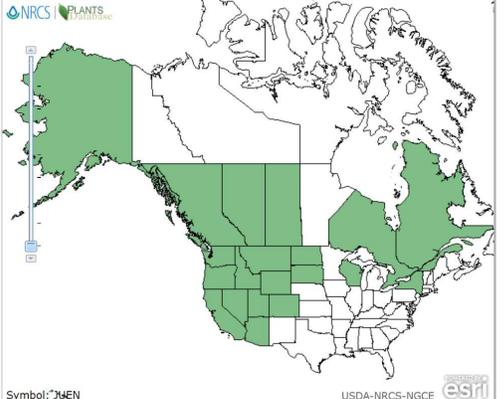
Botanical Illustration courtesy of Jepson Herbarium at UC Berkley

Photo courtesy of Seven Oaks Native Nursery

TAXONOMY

TAXONOMY	
Plant Family	
Scientific Name	Juncaceae
Common Name	Rush Family
Species Scientific Name	
Scientific Name	<i>Juncus ensifolius</i> Wikstr.
Varieties	<i>Juncus ensifolius</i> Wikstr. var. <i>major</i> Hook. (JUEM) Note that there are other varieties given by other sources, this list reflects only those variations listed in the USDA plants database
Sub-species	None recognized by USDA Plants database
Cultivar	
Common Synonym(s)	<i>Juncus xiphioides</i> E. Mey. var. <i>triandrus</i> Engelm.
Common Name(s)	Sword Leaf Rush, Dagger Leaf rush
Species Code (as per USDA Plants database)	JUEN

GENERAL INFORMATION

Geographical range	<p>N. America and south into Mexico (<i>var ensifolius</i>)^{3,4} (see maps), North Eastern Asia⁴ and likely introduced into Wisconsin, New York⁹, Ontario, Quebec, Northern Europe³, Hawaii, and New Zealand⁴</p> <div style="display: flex; justify-content: space-around;">   </div> <p>Symbol: JUEN California Nevada USDA-NRCS-NGCE esri</p>
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Maps courtesy of USDA plants database

Ecological distribution	Areas of high moisture, such as pond and stream banks, wet meadows, and ditches ⁷
Climate and elevation range	From low to high mountain elevations ⁷
Local habitat and abundance	<p>Frequent to common native wetland species¹⁰ Considered rare in the Great Plains in Saskatchewan¹⁰ Listed as endangered in New York (despite likely being introduced rather than native)¹⁰ Threat to some native species in Hawaii¹⁰</p>
Plant strategy type / successional stage	<p>Perennial with slender creeping rhizome⁴, reproduction via rhizomes and seed dispersal⁸ Potential for weediness in both areas where it is native and introduced⁹ Spreads and proliferates in disturbed wet soils - however is not only an early seral species – in some regions it can be an indicator of later successional stages¹⁰</p>
Plant characteristics	<p>Graminoid with blade shaped leaves, which fold together lengthwise, surrounding the stem at the base. Thus, their open edge (rather than folded) faces the stem.⁹ This is similar to the behavior of iris leaves. Juncus genus has bisexual flowers¹ which are wind pollinated¹⁰ As it can reproduce via rhizomes, individuals likely have a lifespan of many decades¹⁰</p>

PROPOGATION DETAILS

**Seed Propagation – Plugs
(Information from source 5 unless otherwise noted)**

Ecotype	Rocky Mountains, Western Wyoming
Propagation Goal	Plugs
Propagation Method	Seed
Product Type	<p>Container (plug) Note: this container could be used to establish a seed increase bed, from which the product would be propagules (seeds)⁶</p>
Time to Grow	6 months

Target Specifications	Fill 10 cubic inch cone-tainer with healthy roots
Propagule Collection Instructions	Seeds are collected by hand, either ripe seeds (with split capsules) shaken from plant into collection bags or by removing fruiting heads from the stem as with shears or a hand scythe Seed dispersal occurs shortly after maturation when seed capsules shatter ¹⁰ thus the collection must be timed to be before this occurs. Summer fruiting ³ , July-September ⁴
Propagule Processing/Propagule Characteristics	45 million seeds per pound Seeds viable for decades in soils or peat seedbank ¹⁰
Pre-Planting Propagule Treatments	Storage: cool-dry condition, approximately 10 degrees Celsius and 20-30% relative humidity Cleaning: Once capsules have opened (a few weeks of air drying after collection), separate seed from chaff via shaking in paper sack. Screen cleaning is used to remove larger inert matter (a clipper with a 1.15 mm or smaller screen could be used here). Further fine cleaning can be done with a Westrup laboratory gravity separator with sieve speed at 2.5, fan on with aperture opening at 1.0, deck top at 2.5. bottom at 2.0. No stratification is necessary
Growing Area Preparation / Annual Practices for Perennial Crops	Soil: one part coconut fiber to one part compost to one part perlite Alternative Media: Sunshine #1 (soil-less, peat-based) with Micromax (for micro-nutrients) and Osmocote 14-14-14 (a slow-release fertilizer) ⁶ Container: 10 cubic inch cone-tainer
Establishment Phase Details	Seeding: add pinch of seeds to soil surface in each cavity, press down but do not cover with soil or sand Irrigation: subsurface irrigation used via placing trays in metal tank or trough, filling water to just below the soil surface. Temperature: 32-43° C (90 to 110° F) during day time, approximately 30° C (85° F) at night, with grow lights kept on Another protocol left it at approximately 80° F ⁶
Length of Establishment Phase	5-12 days, 12 should give 90-100% emergence
Active Growth Phase	Fertilized once per week with Miracle Grow All Purpose Plant Food (15-30-15)
Length of Active Growth Phase	6 months
Hardening Phase	Turn off heat, allowing temperatures to reach ambient conditions
Length of Hardening Phase	2 weeks

Harvesting, Storage and Shipping	If these plugs were grown to establish a seed increase bed (instead of for out planting directly) seeds can be harvested from bed each year at an appropriate time ⁶ Note: these beds offer a limited genetic pool – it is of the author’s suggestion that seed increase beds be replanted with wild seeds every couple of growing seasons.
Length of Storage	Harvested seeds could be stored for great lengths of time, as demonstrated by their longevity in soil banks ⁶
Guidelines for Outplanting / Performance on Typical Sites	Hand planted or dibbled into moist soil or standing water 100% survival is typical
Other Comments	It is also common to see <i>Juncus ensifolius</i> transported and sold as bare rootstock rather than in a container ^{10, 8}

INFORMATION SOURCES

References	<p>¹ Balslev, Henrik. “Juncaceae.” <i>Flora Neotropica</i>, vol. 68, 1996, pp. 1–167. <i>JSTOR</i>, www.jstor.org/stable/4393863. Accessed 5 May 2020.</p> <p>² USDA. “<i>Juncus ensifolius</i>.” <i>USDA Plants Database</i>, https://plants.sc.egov.usda.gov/core/profile?symbol=JUEN. Accessed May 6 2020.</p> <p>³ Flora of North America. “<i>Juncus ensifolius</i>.” <i>efloras.org</i>, http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=222000128. Accessed on May 6, 2020.</p> <p>⁴ Peter F. Zika 2015, <i>Juncus ensifolius</i>, in Jepson Flora Project (eds.) Jepson eFlora, Revision 3, /eflora/eflora_display.php?tid=29651, accessed on May 06, 2020.</p> <p>⁵ Tilley, Derek J.. 2011. Propagation protocol for production of Container (plug) <i>Juncus ensifolius</i> Wikstr. plants USDA NRCS - Aberdeen Plant Materials Center Aberdeen, Idaho. In: Native Plant Network. URL: http://NativePlantNetwork.org (accessed 2020/05/05). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources.</p> <p>⁶ Bartow, Amy. 2008. Propagation protocol for production of Propagules (seeds, cuttings, poles, etc.) <i>Juncus ensifolius</i> Wikstrom seeds USDA NRCS - Corvallis Plant Materials Center Corvallis, Oregon. In: Native Plant Network. URL: http://NativePlantNetwork.org (accessed 2020/05/05). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources.</p> <p>⁷ Giblin, David. “<i>Juncus ensifolius</i>.” <i>Burke Herbarium</i>, http://biology.burke.washington.edu/herbarium/imagecollection/taxon.php?Taxon=Juncus%20ensifolius. Accessed May 6, 2020.</p> <p>⁸ Seven Oaks Native Nursery. “<i>Juncus ensifolius</i>” <i>Seven Oaks Native Nursery</i>, https://www.sevenoaksnativenursery.com/native-plants/grasses-rushes-and-sedges/juncus-ensifolius/. Accessed on May 6, 2020.</p> <p>⁹ Marr JK; Trull SJ, 2002. “Noteworthy collection: Michigan. <i>Juncus ensifolius</i> Wikstr.” <i>Michigan Botanist</i>, vol 41(2), pp 46-47. University of Michigan, https://quod.lib.umich.edu/m/mbot/0497763.0041.203/1/--noteworthy-</p>
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	<p>collection-michigan?page=root;size=100;view=image. Accessed May 6 2020</p> <p>¹⁰ Haeussler, Sybille. “Juncus ensifolius (swordleaf rush) data sheet” <i>Invasive Species Compendium</i>, https://www.cabi.org/isc/datasheet/115030#tosummaryOfInvasiveness. Accessed on May 6 2020.</p>
Other Sources Consulted	<p>King County. “sword leaved rush.” <i>King County Native Plant Guide</i>, https://green2.kingcounty.gov/gonative/Plant.aspx?Act=view&PlantID=139. Accessed on May 6 2020.</p>
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Date Protocol Created or Updated	05/06/2020