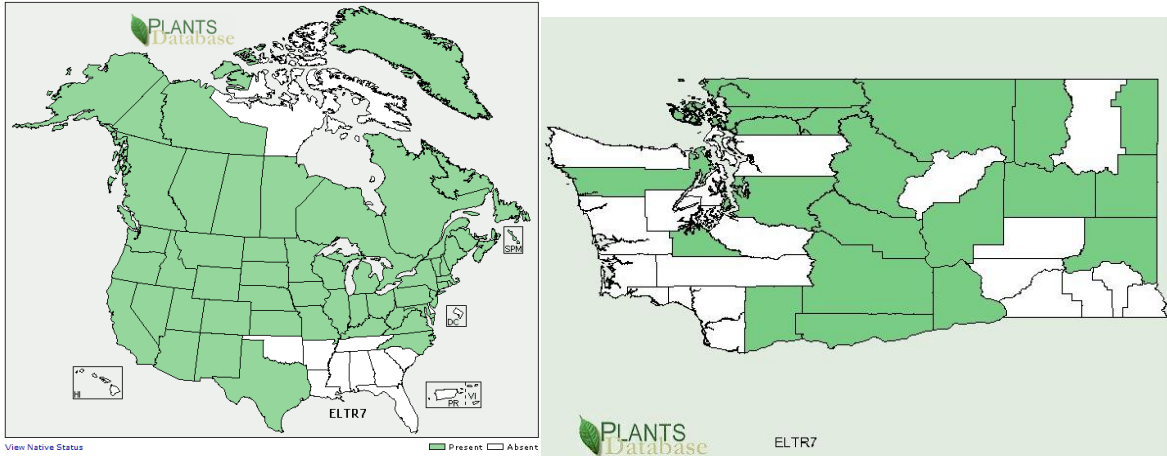


Plant Propagation Protocol for *Elymus trachycaulus* (Link) Gould ex Shinnery ESRM 412 – Native Plant Production

Elymus trachycaulus (Link) Gould ex Shinnery



TAXONOMY	
Family Names	
Family Scientific Name:	Poaceae ⁷
Family Common Name:	Grass ⁷
Scientific Names:	
Genus:	<i>Elymus</i>
Species:	<i>trachycaulus</i>
Species Authority:	(Link) Gould ex Shinnery ⁷
Variety:	n/a
Sub-species:	<i>Subsecundus</i> <i>Trachycaulus</i> ⁷

Cultivar:	n/a
Authority for Variety/Sub-species:	(Link) Gould ex Shinners (for both of them) ⁷
Common Synonym(s) (include full scientific names (e.g., <i>Elymus glaucus</i> Buckley), including variety or subspecies information)	<p><i>Elymus trachycaulus</i> (Link) Gould ex Shinners ssp. <i>Subsecundus</i></p> <p>AGCAU <i>Agropyron caninum</i> (L.) P. Beauv. var. <i>unilaterale</i> (Cassidy) C.L. Hitchc.</p> <p>AGLA5 <i>Agropyron laeve</i> (Scribn. & J.G. Sm.) Hitchc. (Palnt Database)</p> <p>AGPAL <i>Agropyron parishii</i> Scribn. & J.G. Sm. var. <i>laeve</i> Scribn. & J.G. Sm.</p> <p>AGPAL2 <i>Agropyron pauciflorum</i> (Schwein.) Hitchc. ex <i>Silveus</i> ssp. <i>laeve</i> (Scribn. & J.G. Sm.) Gould</p> <p>AGPAG5 <i>Agropyron pauciflorum</i> (Schwein.) Hitchc. ex <i>Silveus</i> var. <i>glaucum</i> (Pease & A.H. Moore) Taylor</p> <p>AGSU <i>Agropyron subsecundum</i> (Link) Hitchc.</p> <p>AGTRC <i>Agropyron trachycaulum</i> (Link) Malte ex H.F. Lewis var. <i>ciliatum</i> (Scribn. & J.G. Sm.) Gleason</p> <p>AGTRG <i>Agropyron trachycaulum</i> (Link) Malte ex H.F. Lewis var. <i>glaucum</i> (Pease & A.H. Moore) Malte</p> <p>AGTRU <i>Agropyron trachycaulum</i> (Link) Malte ex H.F. Lewis var. <i>unilaterale</i> (Cassidy) Malte</p> <p>ELLA4 <i>Elymus laevis</i> (Scribn. & J.G. Sm.) Hoover</p> <p>ELTRG <i>Elymus trachycaulus</i> (Link) Gould ex Shinners ssp. <i>glaucus</i> (Pease & A.H. Moore) Cody ELTRU <i>Elymus trachycaulus</i> (Link) Gould ex Shinners var. <i>unilateralis</i> (Cassidy) Beetle</p> <p><i>Elymus trachycaulus</i> (Link) Gould ex Shinners ssp. <i>Trachycaulus</i></p> <p>AGBR2 <i>Agropyron brevifolium</i> Scribn. AGCAM <i>Agropyron caninum</i> (L.) P. Beauv. ssp. <i>majus</i> (Vasey) C.L. Hitchc.</p> <p>AGCAA <i>Agropyron caninum</i> (L.) P. Beauv. var. <i>andinum</i> (Scribn. & J.G. Sm.) C.L. Hitchc.</p> <p>AGCAH <i>Agropyron caninum</i> (L.) P. Beauv. var.</p>

	<p><i>hornemannii</i> (W.D.J. Koch) Pease & A.H. Moore</p> <p>AGCAM2 <i>Agropyron caninum</i> (L.) P. Beauv. var. <i>mitchellii</i> S.L. Welsh</p> <p>AGPA15 <i>Agropyron pauciflorum</i> (Schwein.) Hitchc. ex Silveus</p> <p>AGPAM <i>Agropyron pauciflorum</i> (Schwein.) Hitchc. ex Silveus ssp. <i>majus</i> (Vasey) Melderis</p> <p>AGPAN4 <i>Agropyron pauciflorum</i> (Schwein.) Hitchc. ex Silveus ssp. <i>novae-angliae</i> (Scribn.) Melderis</p> <p>AGPAT <i>Agropyron pauciflorum</i> (Schwein.) Hitchc. ex Silveus ssp. <i>teslinense</i> (A.E. Porsild & Senn) Melderis</p> <p>AGPAN5 <i>Agropyron pauciflorum</i> (Schwein.) Hitchc. ex Silveus var. <i>novae-angliae</i> (Scribn.) Roy L. Taylor & MacBryde</p> <p>AGSUA <i>Agropyron subsecundum</i> (Link) Hitchc. var. <i>andinum</i> (Scribn. & J.G. Sm.) Hitchc. AGTE4 <i>Agropyron tenerum</i> Vasey</p> <p>AGTE6 <i>Agropyron teslinense</i> A.E. Porsild & Senn</p> <p>AGTR <i>Agropyron trachycaulum</i> (Link) Malte ex H.F. Lewis</p> <p>AGTRM <i>Agropyron trachycaulum</i> (Link) Malte ex H.F. Lewis var. <i>majus</i> (Vasey) Fernald</p> <p>AGTRN <i>Agropyron trachycaulum</i> (Link) Malte ex H.F. Lewis var. <i>novae-angliae</i> (Scribn.) Fernald</p> <p>AGVIA3 <i>Agropyron violaceum</i> (Hornem.) Lange ssp. <i>andinum</i> (Scribn. & J.G. Sm.) Melderis</p> <p>AGVIA2 <i>Agropyron violaceum</i> (Hornem.) Lange var. <i>andinum</i> Scribn. & J.G. Sm.</p> <p>ELDOV <i>Elymus donianus</i> (F.B. White) Á. Löve & D. Löve ssp. <i>virescens</i> (Lange) Á. Löve & D. Löve</p> <p>ELPA12 <i>Elymus pauciflorus</i> (Schwein.) Gould, non Lam.</p>
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	<p>ELTRA2 <i>Elymus trachycaulus</i> (Link) Gould ex Shinners ssp. <i>andinus</i> (Scribn. & J.G. Sm.) Á. Löve & D. Löve</p> <p>ELTRN <i>Elymus trachycaulus</i> (Link) Gould ex Shinners ssp. <i>novae-angliae</i> (Scribn.) Tzvelev</p> <p>ELTRT2 <i>Elymus trachycaulus</i> (Link) Gould ex Shinners ssp. <i>teslinensis</i> (A.E. Porsild & Senn) Á. Löve</p> <p>ELTRA3 <i>Elymus trachycaulus</i> (Link) Gould ex Shinners var. <i>andinus</i> (Scribn. & J.G. Sm.) Dorn</p> <p>ELTRM3 <i>Elymus trachycaulus</i> (Link) Gould ex Shinners var. <i>majus</i> (Vasey) Beetle</p> <p>ROPA7 <i>Roegneria pauciflora</i> (Schwein.) Hyl.</p> <p>ROTR4 <i>Roegneria trachycaula</i> (Link) Nevski</p> <p>TRTR10 <i>Triticum trachycaulum</i> Link ⁷</p>
Common Name(s):	Slender wheatgrass ⁷
Species Code (as per USDA Plants database):	ELTR7 ⁷
GENERAL INFORMATION	
Geographical range (distribution maps for North America and Washington state)	Most of the US, except the Southeast where mean annual precipitation ranges from 9-26 inches. See map above. ⁶
Ecological distribution (ecosystems it occurs in, etc):	It occurs in dry habitats such as meadows, gravel bars, rocky slopes, open forest and drier climate (e.g., Strait of Georgia-Puget Sound area, Willamette Valley) ⁶
Climate and elevation range	It occurs in dry climate and in low elevation. More eastern sources where summer drought is most pronounced had higher dry weight and flowers. ³
Local habitat and abundance; may include commonly associated species	Disturbed sites mostly at low elevations, scattered but widely distributed, in or near settled areas; especially common in fields, lawns, meadows, roadsides, waste areas ⁶
Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)	Early seral species that are wild ranging, highly self-pollinating and important in ecological succession ³
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	Perennial grass form long, tough, stems erect to curved at base, often hairy on leaf sheaths, up to 1m tall. It has short or no auricles and lacks rhizomes. ⁶

	<p>Leaf: flat, firm, hairless to hairy, 5-10 mm wide</p> <p>Inflorescence: spike, erect, stiff, 7-15 cm long, spikelets 1 per node⁶</p>
PROPAGATION DETAILS	
Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	Colorado, Meeker Stock West ⁸
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Seeds ³
Propagation Method (Options: Seed or Vegetative):	Seeds ⁵
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Container (plug) ⁵
Stock Type:	Seeds ⁵
Time to Grow (from seeding until plants are ready to be outplanted):	4 months ³
Target Specifications (size or characteristics of target plants to be produced):	<p>Harvest yields vary due to weather and age of stand. Average annual production is 180 kg/ha (160 lbs/ac).</p> <p>Tight root plug in container³</p>
Propagule Collection (how, when, etc):	<p>Collect seeds when they ripe in late July. In late July, the inflorescence begins to dry and the seed had soft to hard dough. Seed can be stripped from the inflorescence or shake it off the stem or the inflorescence can be clipped the stem with scissors or small scythes just below the seed head. Harvested seed is stored in paper bags at room temperature until cleaned.³</p> <p>50000 seeds/kg 560 kg/ha¹</p>
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	Seed is spread out on a tarp in a dry, sheltered environment and turned daily for approximately 3-5 days, until no moisture or warmth is detected. After drying, material is processed with a Wintersteiger plot combine at concave 1/4 open, speed 1000 rpm, and medium wind. Seed is threshed with a hammermill through a 8/64" round hole screen, and air-screen

	<p>processed on a Clipper M2B or Eclipse cleaner over a 10/64” round hole screen. Due to medium-sized seed, absence of awns, fluff, or other seed debris, and good seed flow, this species is relatively easy to clean. Larger seed lots are processed most efficiently with mechanized cleaning equipment and smaller seed lots usually require more hand labor.</p> <p>Seeds/Kg: 317,000. Germination: 92%. Purity: 100%.</p> <p>When stored at cool temperature, it has 2 year longevity but when it refrigerated, it has 10 year plus longevity^{2,9}</p>
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	Seeds placed in 0-1 °C (32-34 °F) for a 10-day cold stratification treatment and then exposed to 22-25 °C (72-77 °F). ¹
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	In January seed is sown in the greenhouse in 10 cu. in. Ray Leach Super cell containers. Head space of ¼ to ½ inch is maintained in containers to allow deep watering. A thin layer of vermiculite is applied to prevent seeds from floating. Containers are watered deeply. ⁸
Establishment Phase (from seeding to germination):	<p>Sowing Date: Spring or dormant fall.</p> <p>Sowing/Planting Technique: 25-30 pure live seed/ft. (0.3 m) rows, irrigated 91cm (36 in) row spacing, seeded with 2-row double-disk planter with depth bands, seeding depth 1.3 cm (0.5 in).⁶</p> <p>Establishment Phase: Soil surface is kept moist throughout the 10 day germination and emergence period (also helps prevent soil crusting); lower rates of Buctryl or bromoxynil are applied at 3-5 leaf stage to control broadleaf weeds. Fertilizer application is not recommended the first year, as it generally stimulates weed growth and competition.²</p>
Length of Establishment Phase:	2 weeks at most ²
Active Growth Phase (from germination until plants are no longer actively growing):	<p>Rapid Growth Phase: <u>Spring to fall</u>; broadleaf weed control with herbicides must occur prior to boot stage. Plants should be watered deeply daily and fertilized once a week with a complete, water soluble fertilizer containing micro-nutrients. It prefers to grow in a warm and moist mix climate during the active growing phase.⁴</p>
Length of Active Growth Phase:	3 months ⁴
Hardening Phase (from end of active growth phase to end of growing)	Plants are moved to the cold frame in late March or early April, depending on weather conditions. They are

season; primarily related to the development of cold-hardiness and preparation for winter):	watered every other day if the weather is cool, and every day during hot and dry climate. ⁸
Length of Hardening Phase:	2-5 weeks ⁴
Harvesting, Storage and Shipping (of seedlings):	Seedling were lifted in early to late October ³
Length of Storage (of seedlings, between nursery and outplanting):	No storage ³
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	<p>Transplanting is done in early May by using an electric drill and portable generator to drill 1.5 inch diameter holes at the planting site. Survival in seed increase plantings without competing vegetation approaches 100%. ⁸</p> <p>Transplanting into sites with existing vegetation reduces survival and vigor depending on weather conditions following planting. Flowering and seed production occurs the year after transplanting. ⁸</p>
Other Comments (including collection restrictions or guidelines, if available):	<p>Mites have been found in some grass crops and pesticide should be applied when noticed. ¹</p> <p>High heat and/or high humidity reduce seed storage life. Slender wheatgrass is a short-lived species. While plants may be propagated by division, the divisions do not live very long. ¹</p>
INFORMATION SOURCES	
References (full citations):	See below
Other Sources Consulted (but that contained no pertinent information) (full citations):	
Protocol Author (First and last name):	Xincai Cai
Date Protocol Created or Updated (MM/DD/YY):	5/16/2012

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- ²Dremann, C. (2003). Bservations on Bromus Carinatus and Elymus Glaucus Seed Storage and Longevity . *Native Plants* , 4.
- ³Erickson, V. J. (2008). Developing Native Plant Germplasm for National Forest and Grassland in the Pacific Northwest . *Native Plants Journal* , 13.
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- ⁵Kitzmilller, J. H. (2009). Regional genetic variation in three native grasses in Northern California . *Native plants Journal* , 19.
- ⁶L.Johnson, K. (2002). Slender Wheatgrass. *Allen Press*, 8.
- ⁷Mackinnon, P. (2004). *Plants of The Pacific Northwest Coast* . Vancouver : Ministry of Forests and Lone Pine Publishing .
- ⁸*Palnt Database* . (n.d.). Retrieved May 13, 2012, from USDA:
<http://plants.usda.gov/java/profile?symbol=ELTR7>
- ⁹S.Acharya, B. D. (2002). AEC Mountainer Slender Wheatgrass. *Canadian Journal of Plant Science*, 8.
- ¹⁰Skinner, D. (n.d.). *Protocol Information* . Retrieved May 13, 2012, from Native Plants Network .