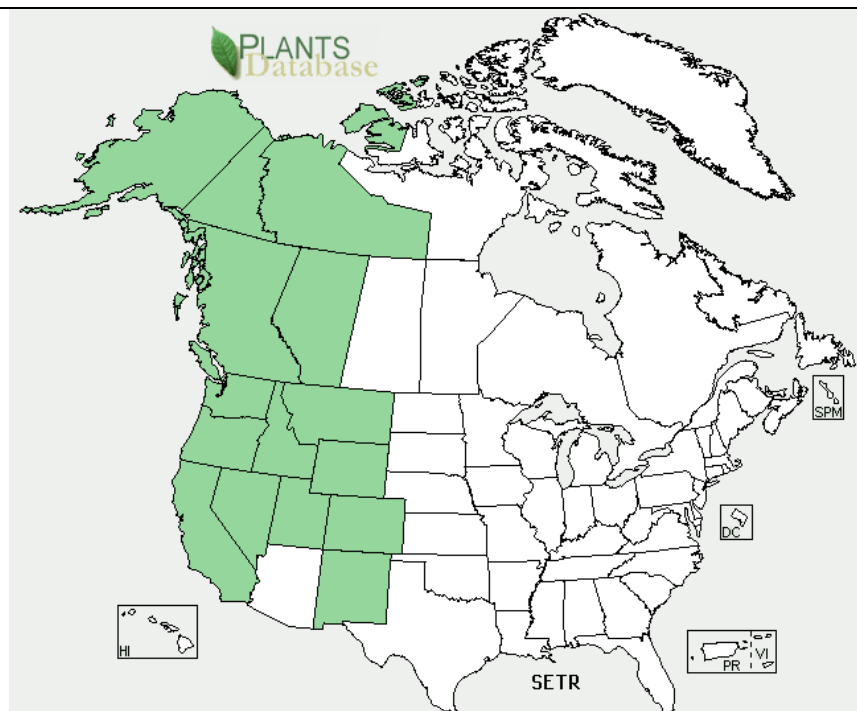


Plant Propagation Protocol for *Senecio triangularis*
ESRM 412 – Native Plant Production

TAXONOMY	
Family Names	
Family Scientific Name:	Asteraceae
Family Common Name:	Sunflower
Scientific Names	
Genus:	Senecio
Species:	trianularis
Species Authority:	Hook
Variety:	
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	
Common Synonym(s) (include full scientific names (e.g., <i>Elymus glaucus</i> Buckley), including variety or subspecies information)	<i>Senecio gibbsonsii</i> Greene <i>Senecio triangularis</i> Hook. var. <i>angustifolius</i> G.N. Jones <i>Senecio saliens</i> Rydberg
Common Name(s):	Arrowleaf groundsel Arrow Leaved Ragwort Arrow butterweed Arrowhead butterweed Arrowleaf ragwort
Species Code (as per USDA Plants database):	STER

GENERAL INFORMATION

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



Ecological
distribution
(ecosystems it
occurs in, etc):

Moist to wet, well-drained meadows, stream banks, slide tracks, thickets, open forest, typically a subalpine to alpine species, but also in seepage areas in middle-elevation forests.

Climate and
elevation range

USDA Hardiness Zone 7, even 6b. (consult map at <http://www.usna.usda.gov/Hardzone/ushzmap.html>)
Sun to part. Shade
Elevation: between 4000 and 11000 feet
Precipitating range: 14–60 inches/yr
pH range: 6.2–7.8 pH
Soil Textures: fine and medium
Minimum Frost-Free Days: 145
Salinity Tolerance: none
Carbon:Nitrogen (C:N) Ratio: high
CaCO₃ Tolerance: medium

Local habitat and
abundance; may
include commonly
associated species

Under natural conditions, the plant occurs almost always in wetlands. a widespread cordilleran species; often at low elevations west of the Cascade Mountains but restricted to mid to high elevations east of the Cascade mountains. It is found from Alaska to Saskatchewan south to California and New Mexico. It inhabits mountain and subalpine meadows and streambanks.

Plant strategy type /
successional stage
(stress-tolerator,
competitor,
weedy/colonizer,
seral, late

Water tolerant – has high abundance of fruits/seeds – 500,000 seeds per pound – moderate seed spread rate and seedling vigor – log life span

successional)	
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	<ul style="list-style-type: none"> • General: Perennial herb, with a fibrous-rooted stem-base or rhizome; stems clustered – 30-150 cm tall. • Leaves: Basal leaves thin, broadly to narrowly triangular to triangular-heart-shaped, square-off at the base, toothed, stalked, hairless above, short hairs on the veins below – stem leaves similar, larger, gradually reduced upwards. • Flowers: ray flowers yellow, usually about 8. Disk flowers yellow, involucre 8-12 mm high. The bracts greenish. • Fruits: hairless achenes • Growth rate: moderate • Lifespan: long • Shape and orientation: erect • Adapted to fine and medium textured soils • Tolerates low temperatures (-15° C to -20° C).
<p align="center">PROPAGATION DETAILS Native Plant Nursery USDI NPS - Glacier National Park West Glacier, Montana 59936</p>	
Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	Subalpine meadows, Logan Pass, 2032m elevation, Glacier National park, Glacier Co., MT.
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Plants
Propagation Method (Options: Seed or Vegetative):	Seed
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Container (plug)
Stock Type:	160 ml containers

Time to Grow (from seeding until plants are ready to be outplanted):	8 Months
Target Specifications (size or characteristics of target plants to be produced):	Height: 7 cm, 4 to 8 true leaves Caliper: n/a Root System: Firm plug in 160 ml container.
Propagule Collection (how, when, etc):	Seeds are hand collected in mid September when achenes easily separate from the receptacle. Seeds are light tan at maturity. Seeds are kept in a well ventilated drying shed prior to cleaning.
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	Seeds are cleaned using a hammermill and screens. Seed longevity is estimated up to 5 years at 3 to 5 C in sealed containers. Seed dormancy is classified as physiological dormancy. Seeds/Kg: 1,000,000/kg = 453720 seeds/pound % Purity: 100% % Germination: 70 to 90%
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	5 month outdoor cold, moist stratification.
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	Outdoor nursery growing facility. Sowing Method: Direct Seeding. Seeds are surface sown for the light requirement. 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 1 gram of Osmocote and 0.20 gram of Micromax per conetainer. Conetainers are filled and sown in late fall and irrigated thoroughly prior to winter stratification.
Establishment Phase (from seeding to germination):	Germination occurs in early spring under fluctuating temperatures. Seeds germinate very uniformly. High germination rates were obtained on seeds that were surface sown vs. no germination on seeds that were covered with medium. Seedlings produced true leaves 3 weeks following germination and are thinned at this stage.
Length of Establishment Phase:	4 weeks
Active Growth Phase (from germination until plants are no longer actively	Once seedlings are established, plants develop rapid shoot and root growth 2 to 4 weeks following germination. Plants have 2 to 4 true leaves by week 3. Plants are fertilized with 20-10-20 liquid NPK fertilizer at 100 ppm weekly during the growing season.

growing):	
Length of Active Growth Phase:	8 to 10 weeks
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):	Plants are fertilized with 10-20-20 liquid NPK fertilizer at 200 ppm in prior to outplanting or in early fall. Irrigation is gradually reduced through September and October.
Length of Hardening Phase:	2 to 4 weeks
Harvesting, Storage and Shipping (of seedlings):	Total Time To Harvest: 8 months Harvest Date: August (year not mentioned) Storage Conditions: Over winter in outdoor nursery under insulating foam cover and snow.
Length of Storage (of seedlings, between nursery and outplanting):	5 months
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	Outplanting Site: Logan Pass, Glacier National Park, Montana. Outplanting Date: After snowmelt; July and August
Other Comments (including collection restrictions or guidelines, if available):	Palatable Browse Animal: High Palatable Graze Animal: Medium Protein Potential: Medium

INFORMATION SOURCES

References (full citations):	<p>United States Department of Agriculture, Natural Resources Conservation Service. "Plant Profile for <i>Senecio triangularis</i> ." 14 April 2009. 11 April 2009. <http://plants.usda.gov/java/profile?symbol=setr>.</p> <p>Native Plant Nursery, USDI NPS - Glacier National Park. "Protocol Information." Native Plants. Native Plant Network. 11 April 2009. <http://www.nativeplantnetwork.org/network/view.asp?protocol_id=33,954>.</p> <p>USDA. "National Arboretum - USDA Plant Hardiness Zone Map ." The United States National Arboretum . 2003. US National Arboretum. 11 April 2009. <http://www.usna.usda.gov/Hardzone/ushzmap.html>.</p> <p>"Arrowleaf Ragwort Plant Information." Garden Guides, Your Guide to Everything Gardening. Hillclimb Media. 11 April 2009. <http://www.gardenguides.com/plants/plant.asp?symbol=SETR#>.</p> <p>Michail Belov. "Description and Images Image of <i>Senecio</i> sp. #1574." Homepage of Chileflora.com. 3 March 2006. Chileflora. 11 April 2009. <http://www.chileflora.com/Florachilena/FloraEnglish/HighResPages/EH1574.htm>.</p> <p>Calflora. "Calflora: <i>Senecio triangularis</i>." Calflora - Search for Plants. undefined. Calflora. 11 April 2009. <http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=7523>.</p>
Other Sources Consulted (but that contained no pertinent information) (full citations):	
Protocol Author (First and last name):	Basel Ismail
Date Protocol Created or Updated (MM/DD/YY):	April 11 2009

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<http://www.nativeplantnetwork.org/network/SampleBlankForm.asp>