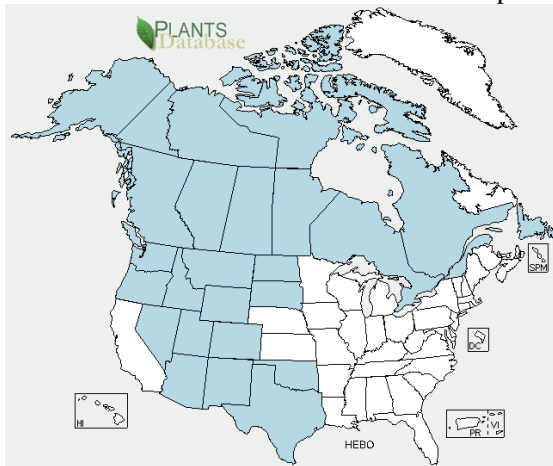


Plant Propagation Protocol for *Hedysarum boreale*
 ESRM 412 – Native Plant Production

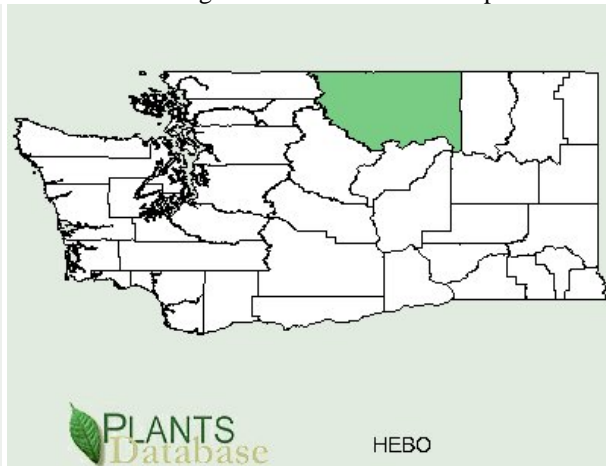


Source: Upper Colorado Environmental Plant Center

North American Native Distribution Map



Washington State Distribution Map



Source: USDA Plants Database

TAXONOMY	
Family Names	
Family Scientific Name:	Fabaceae
Family Common Name:	Pea family
Scientific Names	
Genus:	<i>Hedysarum</i>
Species:	<i>boreale</i>
Species Authority:	Nutt. (1818)
Variety:	
Sub-species:	boreale, mackenziei
Cultivar:	
Authority for Variety/Sub-species:	Nutt., (Richardson) S.L. Welsh

Common Synonym(s):	<i>Hedysarum boreale</i> Nutt. var. <i>cinerascens</i> (Rydb.) Rollins <i>Hedysarum boreale</i> Nutt. var. <i>obovatum</i> Rollins <i>Hedysarum boreale</i> Nutt. var. <i>pabulare</i> (A. Nelson) Dorn <i>Hedysarum boreale</i> Nutt. var. <i>rivulare</i> (L.O. Williams) Northstrom <i>Hedysarum boreale</i> Nutt. var. <i>typicum</i> Rollins <i>Hedysarum boreale</i> Nutt. var. <i>utahense</i> (Rydb.) Rollins
Common Name(s):	Utah sweetvetch
Species Code:	HEBO
GENERAL INFORMATION	
Geographical range:	Utah sweetvetch is widely distributed in the Intermountain West, Montana, south to Colorado and Utah, and east as far as Texas. ⁷ See Distribution maps above.
Ecological distribution:	Utah Sweetvetch is most commonly found in semi-deserts, foothills, canyons, shrublands and woodland openings.
Climate and elevation range:	Utah sweetvetch is found at elevations between 4000 to 8000 feet, in areas receiving 10 to 18 inches of precipitation annually. It grows best with 15 inches or more of precipitation and minimum resource competition. ⁴
Local habitat and abundance:	Utah sweetvetch can be found in the mountain brush, ponderosa pine, pinyon-juniper and big sage brush vegetative zones. ²
Plant strategy type / successional stage:	Some sources report Utah sweetvetch as being a weedy colonizer, due in part to its rhizomatous propagation. ¹
Plant characteristics:	Utah sweetvetch is a native perennial, cool season, herbaceous legume (forb). ⁷ It has deep taproots and several lateral roots, which allow the plant to extract deep soil moisture and nutrients. Due to the ability to extract water deep deep beneath the soil, it possesses significant drought resistance and winter hardiness. ⁵ The main stems arise from a woody crown and may grow 1 to 2 feet tall. The leaves are compound with two or more leaflets, and unlike many other vetches, it is hairless. ⁴ Flowers can vary between pink, purple or white arranged in a loose raceme (indicative of the pea family). ⁴ Seeds develop in a long constricted pod, with several

	sections. Each section contains one brown kidney-shaped seed. ⁵
PROPAGATION DETAILS	
Propagation Details sourced from Lapp, Joyce; Evans, Jeff.; Wick, Dale. 2001.	
Ecotype:	Festuca idahoensis grassland Saint Mary, Glacier National Park, Glacier Co., MT.
Propagation Goal:	Plants
Propagation Method:	Seed
Product Type:	Container (Plug)
Stock Type:	172 ml conetainers
Time to Grow:	7 months
Target Specifications:	Stock Type: Container seedling Height: 5 to 6 true leaves, 6 cm Root System: firm plug in conetainer.
Propagule Collection:	Seeds are hand collected in late August when loment turn tan. Seeds are reddish brown at maturity. Pods are collected in paper bags and 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 with a hammermill and screened. Seed longevity is up to 10 years at 1 to 3C in sealed containers. Seed dormancy is classified as physical dormancy. Seeds/Kg: 180,000/kg % Purity: 100% % Germination: 60%
Pre-Planting Propagule Treatments:	Seeds were soaked in H2O for 24 hours and sown.
Growing Area Preparation / Annual Practices for Perennial Crops:	Greenhouse and outdoor nursery growing facility. Sowing Method: Direct Seeding. Seeds are covered with media. Growing media used is 70% 6:1:1 milled sphagnum peat, perlite, and vermiculite and 30% sand with Osmocote controlled release fertilizer. Greenhouse temperatures are maintained at 21 to 25C during the day and 16 to 18C at night. Seedlings are hand watered and remain in greenhouse until mid May. Seedlings are then moved to outdoor nursery for the remainder of the growing season. Seedlings are irrigated with Rainbird automatic irrigation system in early morning until containers are thoroughly leached. Average growing season of nursery is from late April after snowmelt until October 15th.
Establishment Phase:	Media is kept slightly moist during germination. Germination appeared complete in 3 weeks.
Length of Establishment Phase:	Four weeks

Active Growth Phase:	Root development occurs rapidly following germination. Plants are fertilized with 13-13-13 liquid NPK fertilizer at 100 ppm until root tightness is obtained at 10 weeks. Shoot growth had 4 to 5 leaflets at week 10.
Length of Active Growth Phase:	Ten weeks
Hardening Phase:	Plants are fertilized with 10-20-20 liquid NPK at 200 ppm during August and September. Irrigation is gradually reduced in September and October. Plants were given one final irrigation prior to winterization.
Length of Hardening Phase:	Eight Weeks
Harvesting, Storage and Shipping:	Total Time To Harvest: 7 months Harvest Date: September Storage Conditions: Overwinter in outdoor nursery under insulating foam cover and snow.
Length of Storage:	Five months
Guidelines for Outplanting / Performance on Typical Sites:	Outplant during the Spring or Fall. Seedlings should exhibit 5 to 6 true leaves, at an approximate height of 6 cm. The root system should form a firm plug in the container.
Other Comments:	
PROPAGATION DETAILS Propagation Details sourced from Winslow, Susan R. 2002.	
Ecotype:	Saint Mary, Glacier National Park, Glacier Co., MT.
Propagation Goal:	Seeds
Propagation Method:	Seed
Product Type:	Propagules (seeds, cuttings, poles, etc.)
Stock Type:	No information Supplied
Time to Grow:	No information Supplied
Target Specifications:	Harvest yields vary due to weather and age of stand. Average annual production is 124 kg/ha (111 lb/ac).
Propagule Collection:	Wildland collection occurs late July to mid August after the purplish pea-like flower matures into a yellowish colored loment (pod-type fruit with constricted segments), and has not begun to dehisce (separate at maturity) from the plant; the loment is easily hand harvested, yet timing is critical due to premature shattering. One collection hour/person yielded 76 grams (2.7 oz) clean seed and varies by year, stand density, and collector experience.
Propagule Processing/Propagule Characteristics:	Seed Processing: 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

	<p>detected. After drying, seed is threshed with a hammermill through an 12/64” round hole screen, air-screen processed on a Clipper M2B or Eclipse cleaner over a 17/64” round hole screen with moderate wind. Due to large seed size, the absence of seed debris, and fair seed flow, this species is moderately 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: 248,000. Purity: 100%.</p>
Pre-Planting Propagule Treatments:	None required
Growing Area Preparation / Annual Practices for Perennial Crops:	<p>Propagation Environment: Seedbed is firm and free of weeds with good field moisture to 4” depth.</p> <p>Seed Propagation Method: Direct seeding.</p>
Establishment Phase:	<p>Sowing Date: Late fall.</p> <p>Sowing/Planting Technique: 25-30 pure live seed/ft (0.3 m) row, irrigated 91-cm (36-in) row spacing, seeded with push-type belt seeder, optimum seeding depth 1.3 cm (0.50 in).</p> <p>Establishment Phase: Irrigate as needed to maintain adequate soil moisture (also helps prevent soil crusting (also helps prevent soil crusting)).</p> <p>Fertilizer application is not recommended the first year, as it generally stimulates weed growth and competition.</p>
Length of Establishment Phase:	Two Growing Seasons
Active Growth Phase:	Rapid growth Phase: Summer to fall; soil moisture is critical during budding stage, after anthesis, and post harvest to pre-freezeup- -no irrigation is applied during flowering (pollination).
Length of Active Growth Phase:	Two to three growing seasons
Hardening Phase:	N/A
Length of Hardening Phase:	N/A
Harvesting, Storage and Shipping:	<p>Harvest Date: Cultivated harvest occurred on July 6 at the Bridger Plant Materials Center.</p> <p>Seed Storage: Inflorescences were hand-harvested, placed in plastic sacks, and transported to drying area. Seed is placed in cloth or paper seed sacks, and stored in a cool, dry environment.</p> <p>Seed Dormancy: Classified as physical dormancy.</p>
Length of Storage:	Five to Seven years
Guidelines for Outplanting / Performance on Typical Sites:	Outplanting Sites: St. Mary Visitor Center and St. Mary Prairie.
Other Comments:	Utah sweetvetch has been used to stabilize soil embankments along roadsides, as well as

	<p>simultaneously beautifying the countryside.⁵</p> <p>Like many legumes, Utah sweetvetch fixes nitrogen from the atmosphere into organic compounds usable by the plant with the aid of Rhizobia bacteria. Inoculation with the proper rhizobium will enhance nitrogen fixation.⁵</p> <p>Utah sweetvetch is subject to root-rots, seed pod insects and some rust. Insecticides may be necessary in seed production fields to prevent infestation of bruchid weevil larvae in developing seed.⁵</p> <p>Bees and bumblebees are needed for pollination, as Utah sweetvetch is susceptible to inbreeding depression.⁶</p> <p>No seed is produced the first season. However, 10 to 35 percent can be expected the second year and full production on the third year.⁴</p>
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INFORMATION SOURCES

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Other Sources Consulted:	
Protocol Author:	Michael Carey
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