Plant Propagation Protocol for *Besseya wyomingensis*

ESRM 412 – Native Plant Production

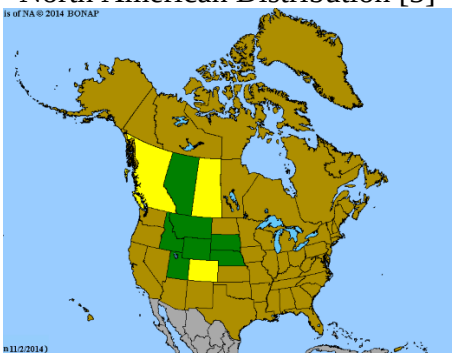
URL: https://courses.washington.edu/esrm412/protocols/2023/BEWY.pdf

[8]

TAXONOMY	
Plant Family	Scrophulariaceae
Scientific Name	Scrophulariaceae
Common Name	Figwort Family
Species Scientific Name	*Besseya wyomingensis*
Scientific Name	*Besseya wyomingensis* (A. Nelsom) Rydb.
Varieties	N/A
Sub-species	N/A
Cultivar	*Besseya wyomingensis*
Common Synonym(s)	*Besseya cinerea* (Raf.) Pennell [BECI2] [4] *Synthyris wyomingensis* (A. Nelson) A. Heller [2] *Veronica wyomingensis* (A. Nelson) M. M. Martinezz Ort. & Albach. [6]
Common Name(s)	Wyoming kittentail, Wyoming besseya, coral-drops [2]
Species Code (as per USDA Plants database)	BEWY

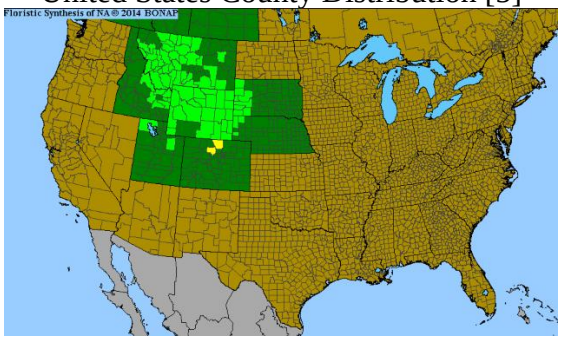
GENERAL INFORMATION

North American Distribution [5]



Yellow = species present and rare, green = species in state and native

United States County Distribution [5]



Dark green = species in state and native, light green = species present and not rate, yellow = species present and rare

Geographical range	*Besseya wyomingensis* is native to Canada, the contiguous United States and China [10]. It is found in Canada from southern Alberta to southern Saskatchewan [9]. In the United States *B. wyomingensis* is found in Idaho, Montana, Colorado, Utah, Wyoming, Kansas and Nebraska [5].
Ecological distribution	*B. wyomingensis* is found in montane, subalpine and alpine grasslands. It can also be found in open coniferous forests, and upland fescue grassland slopes [3].
Climate and elevation range	1000-3700 m [6]
Local habitat and abundance	*B. wyomingensis* is often associated with *Bombus frigidus* (frigid bumble), *Bombus sylvicola* (forest bumblebee) and the *Bombus insularis* (indiscriminate cuckoo bumblebee) [8]
Plant strategy type / successional stage	N/A
Plant Characteristics	*B. wyomingensis* is a perennial, dicot forb-herb [4]. It can grow to be 15-30 centimeters, its stems are erect, grey-

	puberulent to villous. There are both basal and cauline leaves. The basal leaves are long-petioled, about 2-5 cm long, and 1.5-4cm wide. The basal leaves are ovate to oblong with an obtuse ape, and a reddish tinge. They are pinnately veined with a crenate to serrate margin. The cauline leaves are small, sessile, alternate with a lanceolate to ovate shape with a toothed to entire margin. *B. wyomingensis* inflorescence is a dense spike with a 2-5 cm long flower and a 5-15 cm long fruit. The inflorescence is densely pubescent and normally purplish-tinged. The flowers are perfect and zygomorphic. The flowers have a two-lobed calyx, two stamens, and no present corolla. The fruits are capsules that house many seeds, they are about as long as they are wide and villous. The seeds are flat and orbicular [9].
Propagation Protocol for Production of *Besseya wyomingensis* Plants by Jerry and Carol Baskin [1]	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Seeds
Product Type	Container (plug)
Stock Type	N/A
Time to Grow	N/A
Target Specifications	N/A
Propagule Collection Instructions	N/A
Propagule Processing/Propagule Characteristics	Seeds exhibit physiological dormancy.
Pre-Planting Propagule Treatments	Seeds are placed in cold moist stratification for 6-90 days. Germination occurs at 22º C.
Growing Area Preparation / Annual Practices for Perennial Crops	N/A
Establishment Phase Details	N/A
Length of Establishment Phase	N/A
Active Growth Phase	N/A
Length of Active Growth Phase	N/A
Hardening Phase	N/A
Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	N/A
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	N/A
Propagation Protocol for Production of *Besseya wyomingensis* Plants by Tara Luna, Jeff Evans and Dale Wick [7]	

Ecotype	Alpine fellfield, scree, Scenic Point, Glacier National Park, Glacier Co., MT., 7000’ elevation
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	160 ml conetainer
Time to Grow	2 years
Target Specifications	Stock Type: Container seedling. Height: 3cm Caliper: N/A Root System: firm plug in conetainer
Propagule Collection Instructions	Collect mature capsules in August at higher elevations when they begin to split and turn tan in color. Seeds are red brown at maturity. Capsules are collected in paper bags and kept in a well-ventilated drying shed prior to cleaning.
Propagule Processing / Propagule Characteristics	Seeds are hand cleaned at the nursery. Seed longevity is unknown. Seed dormancy is classified as physiological dormancy. Seeds/Kg: unknown % Purity: 100% % Germination: 14%
Pre-Planting Propagule Treatments	5-month outdoor cold, moist stratification. A 60–90-day cold, moist stratification results in good germination percentages.
Growing Area Preparation / Annual Practices for Perennial Crops	Outdoor nursery growing facility. Sowing Method: Direct Seeding. Seeds are lightly covered with medium. 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 172 ml conetainer. Conetainers are filled and sown in late fall and irrigated thoroughly prior to winter stratification. Seedlings germinate in spring under fluctuating outdoor temperatures and are grown under full sun exposure. 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 Details	Medium is kept slightly moist during germination. True leaves emerge by 3 weeks.
Length of Establishment Phase	4 weeks

Active Growth Phase	Root development occurs rapidly following germination. Only 2 true leaves emerged during the first growing season.
Length of Active Growth Phase	8 weeks
Hardening Phase	This species is a cool-season perennial that becomes dormant by mid-August.
Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	Total Time to Harvest: 2 years Harvest Date: September of the second year Storage Conditions: Overwinter in an outdoor nursery under insulating foam cover and snow.
Length of Storage	5 months
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	This species produces a well-branched primary root. Root-tight containerized plants were not obtained during the first growing season.
INFORMATION SOURCES	
References	[1] Baskin, Jerry M., and Carol C. Baskin. "Scrophulariaceae (Besseya)." *Reforestation, Nurseries & Genetic Resources*, 2002, npn.rngr.net/propagation/protocols/Scrophulariaceae-besseya-1833/?searchterm=Besseya%20wyomingensis [2] "Besseya Wyomingensis." *Integrated Taxonomic Information System – Report*, www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=33501#null. Accessed 16 May 2023. [3] "Besseya wyomingensis." *Lady Bird Johnson Wildflower Center – The University of Texas at Austin*, www.wildflower.ord/plants/result.php?id_plant=BEWY. Accessed 16 May 2023. [4] "Besseya Wyomingensis." *USDA Plants Database*, plants.usda.gov/home/plantProfile?symbol=BEWY. Accessed 16 May 2023. [6] Heller, (A. Nelson) A., and Larry D. Hufford. "Synthyris Wyomingensis" *Synthyris Wyomingensis – FNA*, floranorthamerica.org/Synthyris_wyomingensis. Accessed 16 May 2023. [7] Luna, Tara, et al. "Scrophulariaceae (Besseya). » *Reforestation, Nurseries & Genetic Resources*, 2008, npn.rngr.net/npn/propagation/protocols/scrophulariaceae-besseya-213/?searchterm=Besseya%20wyomingensis. [8] Program, Montana Natural Heritage. "Wyoming Kittentails – Besseya Wyomingensis." *Wyoming Kittentails*, 16 May 2023, fieldguide.mt.gov/speciesDetail.aspx?elcode=PDSCR09070.

	[9] "Virtual Herbarium of Plants at Risk in Saskatchewan: A Natural Heritage." *Department of Biology – Arts and Science*, biolwww.usask.ca/rareplants_sk/root.htm/en/plants-description/besseya-wyomingensis/r-besseya-wyomingensis.php. Accessed 16 May 2023. [10] "Wyoming Kittentail." *EOL*, eol.org/pages/39921852. Accessed 16 May 2023.
Other Sources Consulted	"Floral Structure of Besseya and Synthyris (Scrophulariaceae)." *The University of Chicago Press Journals*, 2 June 1992, www.journals.uchicago.edu/doi/abs/10.1086/297025.
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