

Plant Propagation Protocol for *Hackelia floribunda*

ESRM 412 – Native Plant Production

Protocol URL: [https://courses.washington.edu/esrm412/protocols/\[HAFL2.pdf\]](https://courses.washington.edu/esrm412/protocols/[HAFL2.pdf])

Hackelia floribunda (manyflower stickseed)



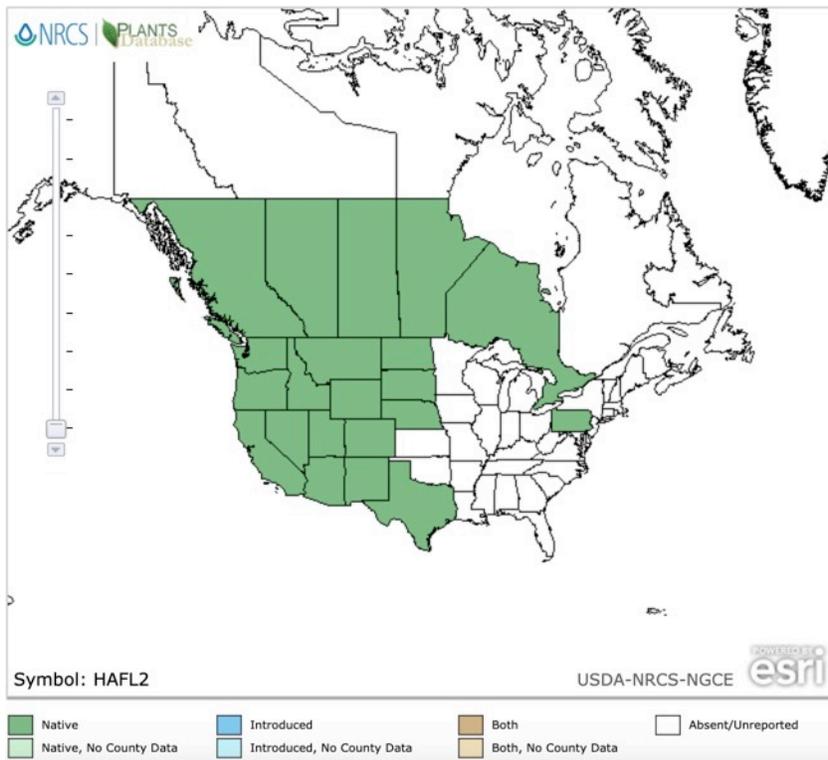
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[9] © Gary A. Monroe 2010

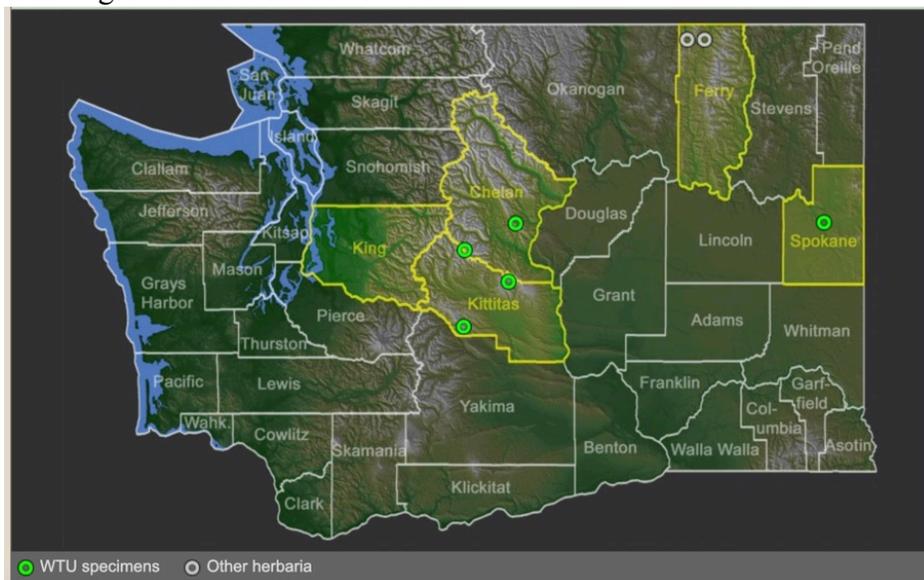
[9,4]

North American Distribution:



[9]

Washington State Distribution:



[6]

TAXONOMY	
Plant Family	
Scientific Name	Boraginaceae
Common Name	Borage Family ^[11]
Species Scientific Name	
Scientific Name	<i>Hackelia floribunda</i> (Lehm.) I.M. Johnst.
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	<i>Hackelia leptophylla</i> (Rydb.) I.M. Johnst. ^[9] <i>Lappula floribunda</i> (Lehm.) Greene ^[9]
Common Name(s)	Manyflower stickseed ^[9] , Many flowered stickseed ^[3] , Large-flowered stickseed ^[4]
Species Code (as per USDA Plants database)	HAFL2
GENERAL INFORMATION	
Geographical range	See maps above. Occurs east of the Cascades crest in WA, Southern British Columbia south to California, east of the Rocky Mountains ^[6] Native from Washington to northern California and southern Nevada; east to northern New Mexico, Colorado, and Montana ^[7]

	Also native to Deep Creek Mountains of southeast Idaho ^[5]
Ecological distribution	Meadows, streambanks, other vernal wet areas, occasionally open slopes, and forests ^[8]
Climate and elevation range	Climate: wet in the spring ^[4] Elevation Range: 4594' - 9734' ^[4]
Local habitat and abundance	<p>Mountain shrubland habitat^[10] as well as thickets, meadows, stream banks, and other moist places in the mountains^[6]</p> <p>In Rifle Colorado, commonly associated with: elk sedge (<i>Carex geyeri</i>), Fendler meadowrue (<i>Thalictrum fendleri</i>), lambstongue groundsel (<i>Senecio integerrimus</i>), Letterman's needlegrass (<i>Achnatherum lettermanii</i>), mountain brome (<i>Bromus marginatus</i>), northern bedstraw (<i>Galium boreale</i>), Richardson's geranium (<i>Geranium richardsonii</i>), rosy pussytoes (<i>Antennaria rosea</i>), showy daisy (<i>Erigeron speciosus</i>), western sweet cicely (<i>Osmorhiza occidentalis</i>), and western yarrow (<i>Achillea millefolium</i>)^[10]</p> <p>The conservation status if <i>Hackelia floribunda</i> is not of concern^[6]</p>
Plant strategy type / successional stage	
Plant characteristics	<p>See photos above. Dicot^[9] , Biennial and Perennial^[9], Forb/Herb^[9] Flowering from June to August^[3,6,8]</p> <p>The stems are 3-10 dm. tall, solitary or few, the upper portion with appressed, aligned pubescence, the lower with spreading hairs^[6]</p> <p>Basal leaves are oblanceolate and cauline leaves are well developed and numerous. They range from 4-20 cm. long and 5-30 mm. wide.^[6]</p> <p>The <i>Hackelia floribunda</i> has small, pale blue, funnel-shaped flowers which grow in a long, open, branched cluster at top of one or a few leafy stems, branches coiled at tips.^[7]</p> <p>Nutlets are the fruit of the <i>Hackelia floribunda</i>. They have 4 nutlets that are 3-4 mm. long, with marginal prickles free to the base^[6] It is the prickles on the</p>

	nutlets that distinguish these plants from Forget-me-nots (<i>Myosotis</i>). ^[7]
PROPAGATION DETAILS: Container (plug) of <i>Hackelia setosa</i>*^[1]	
Ecotype	May be found in open or wooded regions
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	N/A
Time to Grow	Weeks
Target Specifications	Well-developed crowns, roots and rhizomes filling the soil profile in the container.
Propagule Collection Instructions	N/A
Propagule Processing/Propagule Characteristics	N/A
Pre-Planting Propagule Treatments	This species is best germinated using 90 days cool/moist stratification to break dormancy.
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	* <i>Hackelia setosa</i> is in the same <i>Hackelia</i> genus as <i>Hackelia grandiflora</i> , so the two plants may be closely related enough to propagate well under the same protocol. No protocol information specific to <i>Hackelia grandiflora</i> was available.
PROPAGATION DETAILS : Vegetative Propagation of <i>Hackelia venusta</i>*^[2]	
Ecotype	Dry, eastern slopes of Cascade Mountain range with ponderosa pine
Propagation Goal	Other propagules
Propagation Method	Vegetative

Product Type	Propagules (seeds, cuttings, poles, etc.)
Stock Type	Micro-propagated plantlets
Time to Grow	12 weeks
Target Specifications	Multiply explants and obtain microshoots that were at least 2 cm in height and ready to be rooted
Propagule Collection Instructions	Excised 1.5 to 2.5 cm long shoot tips from newly emerging plants just after the snow melted in the Cascade Range. Shoot tips were refrigerated and transported to the micropropagation lab in Moscow, Idaho.
Propagule Processing/Propagule Characteristics	N/A
Pre-Planting Propagule Treatments	Upon reaching the lab, shoot tips were immediately defoliated and surface sterilized for 20 min in a 1% solution of NaClO. They were then rinsed 3 times in sterile distilled water.
Growing Area Preparation / Annual Practices for Perennial Crops	Shoot tips (explants) were placed on Murashige and Skoog (MS) medium in glass test tubes covered with cotton plugs. Explants were incubated on shelves under cool-white fluorescent light with an 18h:6h (light:dark) photoperiod. Temperatures were kept at 22 degrees C (night) and 27 degrees C (day).
Establishment Phase Details	Explants were grown on the MS medium for 1 month. This gave them time to acclimate to a new growing environment and begin elongating.
Length of Establishment Phase	1 month
Active Growth Phase	After the 1 month establishment phase, explants were removed from test tubes, and any new shoots were excised and placed on fresh MS medium containing 0.04 micromolar benzyl adenine (BA). This procedure was repeated every 4 weeks for 2 months until the lab in Moscow, Idaho had the desired number of shoots.
Length of Active Growth Phase	2 months
Hardening Phase	Shoots were excised from the cultures and transferred to glass tubes containing MS medium with 2 micromolar of indole acetic acid (IAA) added. Rooted shoots were then ready to be acclimated to greenhouse conditions.
Length of Hardening Phase	1 month
Harvesting, Storage and Shipping	If necessary, shoots can be stored in a refrigerator until ready for rooting. Brusyen <i>et. al</i> found that they could be stored up to 5 months in a dark cooler with minimal damage. It is best, though, if shoots can go directly into

	the next phase, whether it be additional multiplication or rooting.
Length of Storage	Up to 5 months
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	* <i>Hackelia venusta</i> is in the same <i>Hackelia</i> genus as <i>Hackelia grandiflora</i> , so the two plants may be closely related enough to propagate well under the same protocol. No protocol information specific to <i>Hackelia grandiflora</i> was available.
INFORMATION SOURCES	
References	See below.
Other Sources Consulted	See below.
Protocol Author	Lia Koklic
Date Protocol Created or Updated	05/29/19

References:

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2. Knoke, Don and Giblin, David (2019) Burke Herbarium Image Collection: *Hackelia venusta*. Available at: <http://biology.burke.washington.edu/herbarium/imagecollection/taxon.php?Taxon=Hackelia%20venusta> Accessed on: 05/28/19