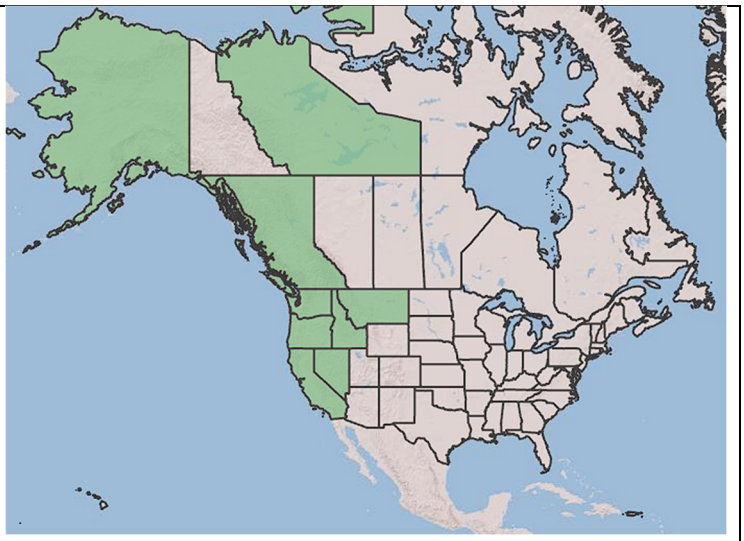
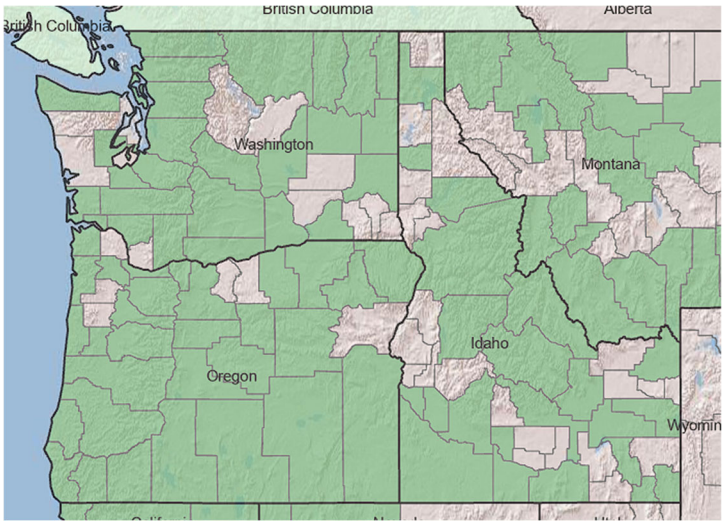
Plant Propagation Protocol for *Cicuta douglasii*
ESRM 412 – Native Plant Production
URL: https://courses.washington.edu/esrm412/protocols/2022/CIDO.pdf


Source: Burke Herbarium Image Collection [7]

TAXONOMY	
Plant Family	
Scientific Name	Apiaceae / Umbelliferae
Common Name	Carrot Family
Species Scientific Name	
Scientific Name	*Cicuta douglasii* (DC.) J.M. Coult. & Rose
Varieties	N/A
Sub-species	N/A
Cultivar	N/A
Common Synonym(s)	Cowbane Beaver poison
Common Name(s)	Western water hemlock
Species Code (as per USDA Plants database)	CIDO
GENERAL INFORMATION	

Geographical range	 North America  Pacific Northwest Source: USDA PLANTS Database [8]
Ecological distribution	This plant thrives in wet conditions and in low laying areas all over Western United States and Canada.[1]
Climate and elevation range	No specific information on *Cicuta douglasii*. However, when looking at poison hemlock (Conium maculatum) a similar species to the Western water hemlock (*Cicuta douglasii*), The preferred precipitation is > 430 mm and < 850 mm annually. With warm average temperatures greater than 10 degrees Celsius and cold average temperatures greater than 0 degrees Celsius all year. [4]

Local habitat and abundance	Typically found in wet areas including small stream beds, river banks or marshy areas. [2] Western Water Hemlock (*Cicuta douglasii*) is commonly associated with spotted / poison hemlock (conium maculatum). [5]
Plant strategy type / successional stage	Competitor or weedy/Colonizer The plant as a whole matures within a growing and flowering season. But one of the main reasons it would be defined as a competitor is that the plant has grown to have toxic characteristics that serve as highly defended against herbivores or other antagonists. [2]
Plant characteristics	*Cicuta douglasii* are perennials that grows from 2 to 8 feet tall. The stems are hollow, and it is easily identifiable by its root – a bulbous structure that is mostly hollow. The leaves are arranged like a feather, diving 1-3 times into narrow-toothed and lance-shaped leaflets 1 – 4 inches long. The flowers are white and grouped in umbrella-shaped clusters. [1]
PROPAGATION DETAILS	
Ecotype	The seeds of a 2020 Ecological study collected seeds from six different locations. They were collected in Altamont – UT, Cokeville – WY, Ely – NV, Gunnison – CO, Logan – UT, and Mackay – ID. [2] These seeds were collected in 2016 between July 19 and August, during the green seed stage. [2]
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container
Stock Type	N/A
Time to Grow	No specific information on *Cicuta douglasii*. However, when looking at poison hemlock development usually occurs over a two year span. During the first-year growth is limited to large rosette. During the spring of the second year the plant develops branching erect stems that begin to develop white flowers. [3]
Target Specifications	In a study looking at Geographical and seasonal variation in water hemlock toxins the target of the study

	was looking for the toxins in the tubulars as well as the flowers and/or seeds. [2]
Propagule Collection Instructions	Green seeds are collected near the end of July or by collecting dry seeds in late August. In this study if flower and seeds were both present on a plant, they were not separated as we were interest in toxic potential of the reproductive part. [2]
Propagule Processing/Propagule Characteristics	Seeds were placed in tuber
Pre-Planting Propagule Treatments	In the same study conducted in 2016 if flower and seeds were both present on a plant, they were not separated as they were interested in the toxic potential of the reproductive part to livestock. [2] After collection seeds were placed on ice immediately and stored at -80 degrees Celsius until processing. [2]
Growing Area Preparation / Annual Practices for Perennial Crops	Not specificized. However, for Poison hemlock in germination tests the media was composed of a 13 to 1 mixture of limestone-derived topsoil and river sand. [6] In the greenhouse the seeds were sowed into 2 by 3 decimeter flats.[6]
Establishment Phase Details	Not specificized. However, for Poison hemlock in germination tests they found that Poison Hemlock have linear embryos which are a type of underdeveloped embryo. Thus the seeds need to begin development before germination can occur. Therefore, seeds would be incubated at 30 degrees Celsius and at hour 6 they were precisely cut. Embryos were cut precisely daily until seeds began to germinate. [6]
Length of Establishment Phase	Germination began around day 10. [6]
Active Growth Phase	No specified treatment. Similar development as the Poison hemlock shows that during the first year growth is limited to a large rosette of dark glossy-green leaves that are at least 2 feet long, sheathed at the base, and divided several times along the main stalk of the leaf. [7]
Length of Active Growth Phase	2 – 3 months [2]

Hardening Phase	No specified treatment. Similar development as the Poison hemlock shows that the plant can remain dormant over the winter and allowed to overwinter. Thus hardening the plant to be able to survive over the winter. [7]
Length of Hardening Phase	3 months
Harvesting, Storage and Shipping	Not typically harvested, stored and shipped due to its negative impact of toxicity.
Length of Storage	Not typically outplanted, as it may harm the ecosystem it is introduced to.
Guidelines for Outplanting / Performance on Typical Sites	No specific information. Mainly because of the toxicity of the plant. Waster hemlock is toxic to all species of livestock. In addition to livestock, there are a number of reports of human poisoning. [2]
Other Comments	*Cicuta douglasii* is one of the more toxic plants known, with the toxic component being cicutoxin, a C17 polyacetylene, and other related C17 polyacetylene compounds.[2]
INFORMATION SOURCES	
References	See Below
Other Sources Consulted	See Below
Protocol Author	Kenzo Yoshitomi
Date Protocol Created or Updated	05/23/22

References:

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3. "Poison Hemlock Management Guidelines--UC IPM". *University Of California Agriculture & Natural Resources*, 2022, http://ipm.ucanr.edu/PMG/PESTNOTES/pn74162.html. Accessed 22 May 2022.

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"Water Hemlock (Cicuta Douglasii) : USDA ARS". *U.S. Department Of Agriculture*, 2018, https://www.ars.usda.gov/pacific-west-area/logan-ut/poisonous-plant-research/docs/water-hemlock-cicuta-douglasii/. Accessed 23 May 2022.

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