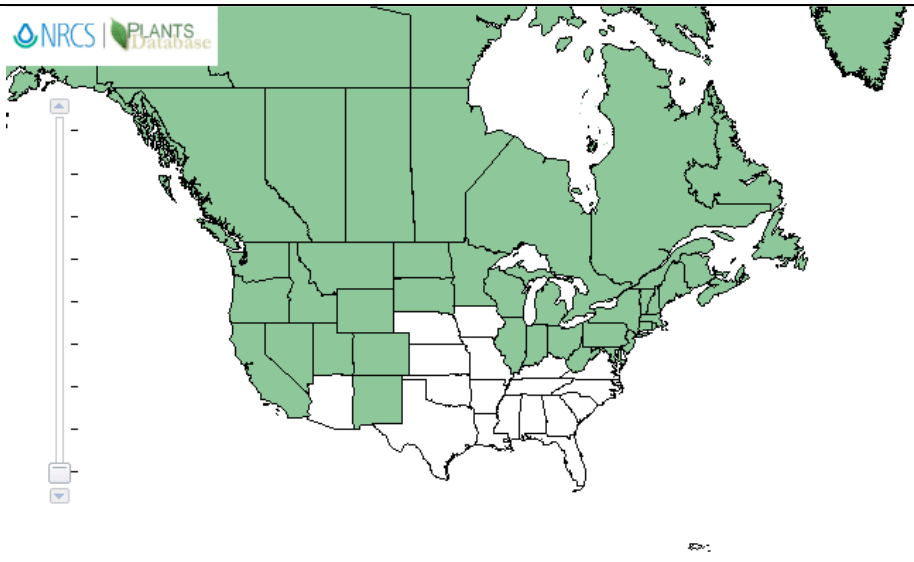
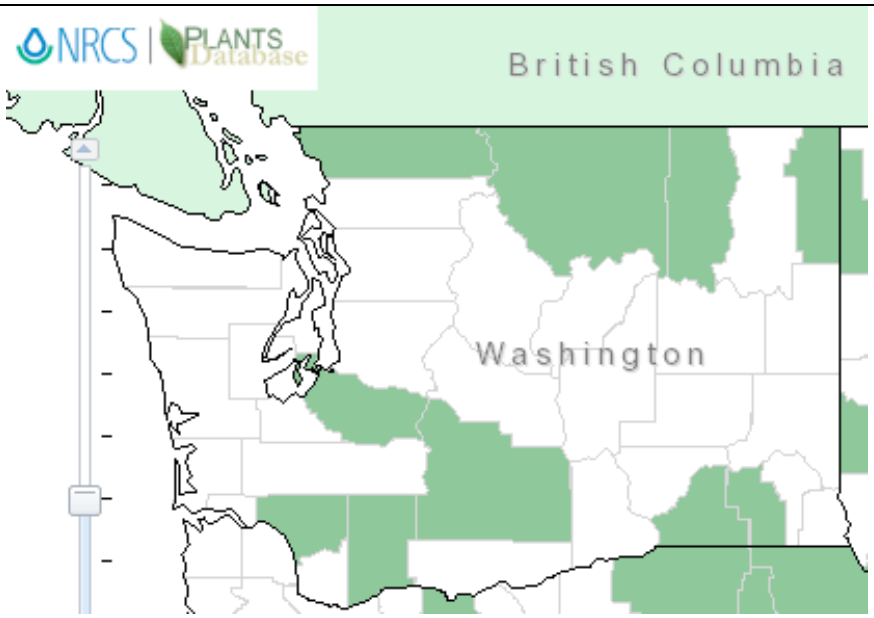
Plant Propagation Protocol for *[Corallorhiza trifada]*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/*COTR18.pdf*

TAXONOMY	
Plant Family	
Scientific Name	Orchidales (1)
Common Name	Orchid Family (1)
Species Scientific Name	
Scientific Name	*Corallorhiza trifida* Chetelain (1)
Varieties	*Corallorrhiza trifida* Chatelain var. *verna* Fernald (1)
Sub-species	N/A
Cultivar	
Common Synonym(s)	N/A
Common Name(s)	Yellow coralroot (1), early coralroot (2)
Species Code (as per USDA Plants database)	COTR18
GENERAL INFORMATION	
Geographical range	

	 (1)
Ecological distribution	The yellow coralroot occurs across much of the world in differing ecosystems. It can usually be found in mixed coniferous forests, as well as cooler mountain slopes and even into open meadows and tundra. It needs shade as well as a good deal of moisture, and so these conditions can be met across a wide variety of ecosystems. It has even been seen in some arctic conditions. (6)
Climate and elevation range	The yellow coralroot needs moist climates to survive, and generally is found in the lower elevations, below 3100 meters. (7)
Local habitat and abundance	The yellow coralroot is always found in the shade of trees or large shrubs. The habitat it prefers seems to be moist upland forests under both conifers and hardwoods. It can also be found in swampy areas where it would be rooting in wet peat or moss. The soil type does not matter much for the coralroot, however the health of the soil is important because it relies on mycorrhizal fungi. In this way it can be found in many old growth forests, and others that have not been greatly disturbed. (5)
Plant strategy type / successional stage	This plant relies on mycorrhizal fungi in early stages in its life, and so can only colonize sites where these fungi are present. In this way, it is a late colonizer, and only of non-disturbed areas. (4)
Plant characteristics	These perennial herbs grow 10 to 36 cm in height and have multiple green to greenish-yellow stems. These plants also have rhizomes below the surface, forming intricately branched whitish structures that can be as deep as 10 cm. Each rhizome has the ability to grow a stem, but often will not. Each stem of the plant will have between 5 and 19 flowers growing near its terminus. The flowers will be small, white, and inconspicuous. The sepals as well as the petals will be yellowish-green in color. The plants will flower mostly between the last week in May and first week in June. These plants are able to propagate vegetatively from the rhizomes as well as from seeds. However, the

	seeds are very small, often referred to as dust seeds, and contain very little storage material. Due to this, the seeds rely on mycorrhizal fungi for successful colonization in nature. The coralroot uses the fungi to help with early accumulation of C. Due to this early stage of relying on the fungus for C, these plants are referred to as myco-heterotrophic plants (MHP). However, these plants will grow out of this juvenile MHP phase and become autotrophs. Yet the fungal partners may be retained into adulthood for these plants. Other varieties of the coralroot within the same genus do not have any chlorophyll and rely completely on the fungus for carbon. (4,5)
PROPAGATION DETAILS (not commercially propagated due to complications of acquiring the mycorrhizal fungi needed by the plant to germinate, I will modify these methods to explain how it propagates in nature)	
Ecotype	The germination details and process explained hereafter are based on an in situ experiment detailing the chronology of *C. trifida* germination from seed that took place in the Tentsmuir Point National Nature Reserve in Scotland. (4)
Propagation Goal	Plants (4)
Propagation Method	Seeds (4)
Product Type	Live plants in the wild. (4)
Stock Type	N/A
Time to Grow	From 12 to 24 months from germination to first flowering in nature. (4)
Target Specifications	Full grown, multiple stems growing up to 35 cm tall.
Propagule Collection Instructions	Seeds were collected from the same site as the experiment was taking place, and tested for viability with the tetrazolium chloride method, which indicated 80-85% viability. (4)
Propagule Processing/Propagule Characteristics	N/A
Pre-Planting Propagule Treatments	Germination occurs predominantly in spring and summer of both the first and second years after seed release. (4)
Growing Area Preparation / Annual Practices for Perennial Crops	N/A
Establishment Phase Details	Seed packets of 40 x 60 mm rectangles of 53-micrometer nylon plankton netting had 50-100 seeds placed inside. These packets were buried vertically in soil, assuring that the seeds lay at a depth of 8 cm. The seed packets were buried in October. The seed packets were harvested 14 months after burial to examine germination rates as well as establishment of mycorrhizal fungi. (4)
Length of Establishment Phase	It was noted from this experiment that the average time to germination across the different habitats was 8 months in the soil after the seed

	packets were buried. (4)
Active Growth Phase	It took 15 months for the first rhizome production to occur, and then at 24 months the apical bud develops further and potentially producing the first scale leaves. (4)
Length of Active Growth Phase	See above.
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	It was noted in the discussion of the experiment where most of this information is based that the habitat that the seeds were allowed to grow greatly affected the growth and germination rates of the plants. This is due to the relative amounts of the mycorrhizal fungi found in different systems as well as other unidentified factors. (4)
INFORMATION SOURCES	
References	1. "Corallorhiza Trifida." Plants Database. USDA, n.d. Web. 23 May 2017. 2. Brown, Paul Martin. *Wild orchids of the northeastern United States: a field and study guide to the orchids growing wild in New England, New York, and adjacent Pennsylvania and New Jersey*. Cornell University Press, 1997. 3. Chalker-Scott, Linda. "Washington's Native Orchids." Master Gardener. Winter ed. N.p.: n.p., 2008. 36-42. Web. 23 May 2017. 4. McKendrick, S. L., et al. "Symbiotic Germination and Development of Myco-Heterotrophic Plants in Nature: Ontogeny of Corallorhiza Trifida and Characterization of Its Mycorrhizal Fungi." *The New Phytologist*, vol. 145, no. 3, 2000, pp. 523–537. *JSTOR*, www.jstor.org/stable/2588820. 5. Smith, W. (2012). *Native Orchids of Minnesota.* Minneapolis: University of Minnesota Press. 6. Brown, Paul Martin, and Stan Folsom. "Corallorhiza." Wild Orchids of the Pacific Northwest and Canadian Rockies. Gainesville: U of Florida, 2006. N. pag. Print. 7. "Corallorhiza Trifida." Flora of North America. N.p., n.d. Web. 23 May 2017. 8. Krupnick, G., McCormick, M., Mirenda, T., & Whigham, D. (2013). The Status and Future of Orchid Conservation in North America 1. *Annals of the Missouri Botanical Garden, 99*(2),

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Other Sources Consulted	1. Bailey, Liberty Hyde, and Wilhelm Miller, eds. *Cyclopedia of American horticulture: comprising suggestions for cultivation of horticultural plants, descriptions of the species of fruits, vegetables, flowers, and ornamental plants sold in the United States and Canada, together with geographical and biographical sketches*. Vol. 1. Macmillan, 1900. 2. Turner, Mark, and Phyllis Gustafson. Wildflowers of the Pacific Northwest. Portland, Or.: Timber, 2006. Print. 3. Pojar, Jim, and A. MacKinnon. Alpine Plants of the Northwest: Wyoming to Alaska. Edmonton, Alberta, Canada: Lone Pine, 2013. Print. 4. MacKinnon, A., and Jim Pojar. Plants of the Pacific Northwest Coast. Vancouver, British Columbia: Partners, 2016. Print.
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