

Plant Propagation Protocol for *Trientalis europaea*

ESRM 412 – Native Plant Production

URL: <https://courses.washington.edu/esrm412/protocols/2023/TREU.pdf>

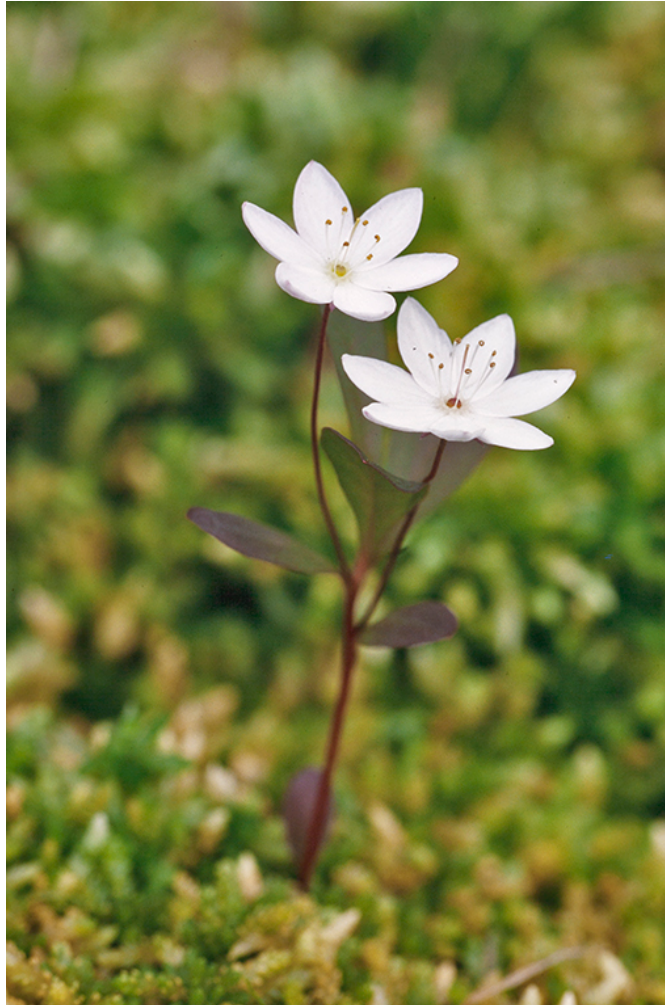
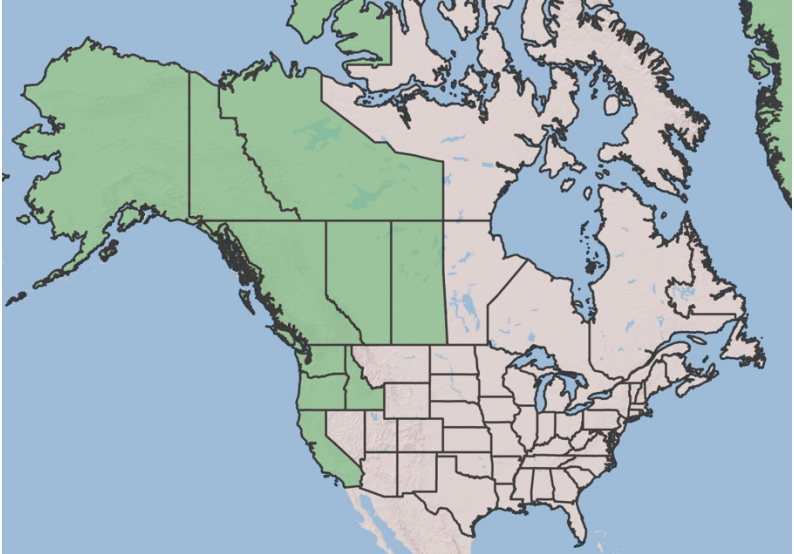
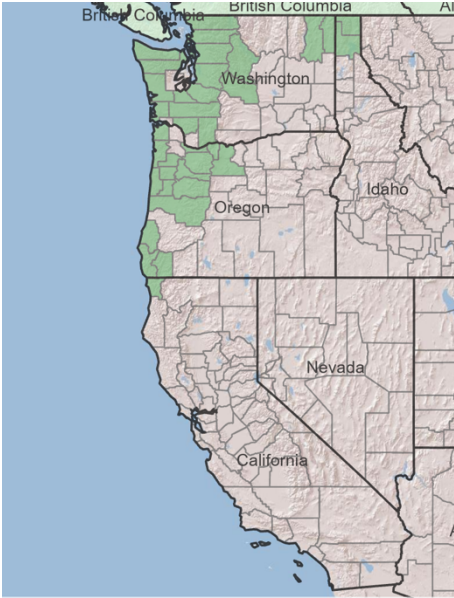
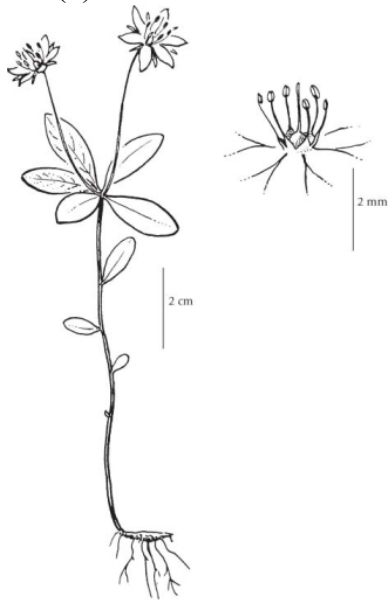


Figure 1: *T. europaea*: Gerald and Buff Corsi 2013 California Academy of Sciences (4).

TAXONOMY	
Plant Family	
Scientific Name	Primulaceae
Common Name	Primrose
Species Scientific Name	
Scientific Name	<i>Trientalis europaea</i> L.
Varieties	None recognized in USDA Plants database.
Sub-species	<i>Trientalis europaea</i> L. ssp. <i>arctica</i> (Fisch. ex Hook.) Hultén (1).
Cultivar	No information available.
Common Synonym(s)	<i>Lysimachia europaea</i> (L.) U. Manns & Anderb. (3) <i>Trientalis arctica</i> Fisch. Ex Hook. (2) <i>Trientalis europaea</i> ssp. <i>arctica</i> (Fisch. ex Hook.) Hultén (2) <i>Trientalis europaea</i> ssp. <i>europaea</i> L. (2)

	<i>Trientalis europaea</i> var. <i>arctica</i> (Fisch. ex Hook.) Ledeb. (2)
Common Name(s)	arctic starflower (1) chickweed-wintergreen (11)
Species Code (as per USDA Plants database)	TREU (1)
GENERAL INFORMATION	
Geographical range	 <p>Figure 2: Distribution of <i>T. europaea</i> in North America (1).</p>  <p>Figure 3: Distribution of <i>T. europaea</i> in Washington, Oregon, and California (1).</p>
Ecological distribution	<i>T. europaea</i> occurs in bogs and swamps (5). It can also be found in meadows and coastal ecosystems, including the Freshwater Wetland, Northern Coastal Scrub, and wetland-riparian communities (4). <i>T. europaea</i> can be found on soils that have highly acidic, humus-rich surface horizons (6).

Climate and elevation range	<i>T. europaea</i> can be found in low to mid-elevations in the mountains (5), found at an average elevation of 563 meters (8). This plant likes wet places, with annual precipitation ranging from 59.0"-114.2" (7).
Local habitat and abundance	Commonly found with species in the Freshwater Wetland, Northern Coastal Shrub, and wetland-riparian communities (4).
Plant strategy type / successional stage	<i>T. europaea</i> can tolerate light (sandy), medium (loamy, and heavy (clay) soils. It is tolerant to very acidic soils. It can grow in semi-shade or no shade, making it slightly shade tolerant (10). It is mainly absent from most open and most deeply shaded sites (6).
Plant characteristics	<p><i>T. europaea</i> is a perennial herb with stems that are 5-20 cm tall (5,9). The leaves are whorled and become alternate and progressively or abruptly smaller proximally (figure 4). The blades are obovate or oblanceolate to spatulate and even sometimes elliptic. They are about 2-6 cm long (9). This herb has 1-2 pedicels that are 1.5-5.5 cm long (9).</p> <p>The flowers are white with lobes ovate to broadly elliptic or lanceolate and they flower in the summer (9).</p>  <p style="text-align: center;"><i>Trientalis europaea</i> ssp. <i>arctica</i></p>
PROPAGATION DETAILS (SEED)	
Ecotype	No information available.
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container, seeds
Stock Type	No information available.
Time to Grow	No information available.
Target Specifications	No information available.
Propagule Collection Instructions	Seeds should be collected in early autumn as most seeds are shed by October or November, although some clusters may stay on the dried-up shoot through mid-winter. The seeds can be collected by hand (6).

Propagule Processing/Propagule Characteristics	Seed that was collected in Scotland had a mean mass of 0.68 mg per 1000 seeds (6).
Pre-Planting Propagule Treatments	<i>T. europaea</i> has a very impermeable seed coat. Soaking the seeds so they swell sufficiently enough that the seed coat can break will greatly improve chances of germination. This process has been experimentally shown to speed up when the seeds were preliminarily frozen for 18 weeks (6). <i>T. europaea</i> has a strong innate dormancy and remains viable <i>in situ</i> after 5 years (6).
Growing Area Preparation / Annual Practices for Perennial Crops	The seeds can be sown into a cold frame into acidic soils with light shade (10).
Establishment Phase Details	The seeds should be planted in the spring after the seed coats have been broken (6,10).
Length of Establishment Phase	About 3 months (10).
Active Growth Phase	Once the seedlings are large enough to handle, they should be moved from the cold frame and placed into individual containers in early summer (10).
Length of Active Growth Phase	No information available.
Hardening Phase	No information available.
Length of Hardening Phase	No information available.
Harvesting, Storage and Shipping	No information available.
Length of Storage	Seedlings can be stored for short periods of time (10).
Guidelines for Outplanting / Performance on Typical Sites	In an experimental setting, 100 <i>T. europaea</i> seeds were sown into in undisturbed and disturbed (ground vegetation removed) plots. Up to 2 years after sowing in these plots, 38 seedlings developed in the undisturbed plots and 72 seedlings developed in the disturbed plots (6). Flowering will occur in June-July (6).
Other Comments	Each <i>T. europaea</i> only has about 8 seeds per plant (6), so it is important to note that it may be difficult to obtain enough seed to produce many successful germinants without depleting a population. Be mindful when collecting seed in the wild as to not deplete seed sources.
PROPAGATION DETAILS (VEGETATIVE)	
Ecotype	No information available.
Propagation Goal	Tubers/rhizomes
Propagation Method	Vegetative
Product Type	Propagules (tubers)
Stock Type	No information available.
Time to Grow	About 3 months (6).
Target Specifications	No information available.

Propagule Collection Instructions	The tuber lays a few centimeters below the soil surface. By September, the daughter tubers have formed and can be collected by hand (6).
Propagule Processing/Propagule Characteristics	No information available.
Pre-Planting Propagule Treatments	For tubers in general, once removed from the ground and severed from the dead stem, clean the soil off the tuber. The tubers can be left intact for the winter and divided in the spring, or they can be divided in the fall. The tubers can be stored in a well-ventilated area with constant temperatures between 60-70 degrees F out of the sunlight for a few days. They can also be stored over winter by being chilled below 50 degrees F but above freezing and stored in material that maintains moisture but allows air flow (12).
Growing Area Preparation / Annual Practices for Perennial Crops	Moist, acidic soils with light shade (10).
Establishment Phase Details	No information available.
Length of Establishment Phase	Shoots will emerge from tubers in early May (6).
Active Growth Phase	No information available.
Length of Active Growth Phase	Shoots will dry up by the end of September and new daughter tubers have been formed (6).
Hardening Phase	No information available.
Length of Hardening Phase	Tubers are underground throughout the winter until early May (6).
Harvesting, Storage and Shipping	No information available.
Length of Storage	Tubers can be stored for short periods of time (10).
Guidelines for Outplanting / Performance on Typical Sites	Flowers will form in May after the new aerial shoot is produced (6). Shoots will be 5-20 cm in height (5,9).
Other Comments	None.

INFORMATION SOURCES

References	<p>(4) Calflora. (2023). <i>Trientalis europaea</i>. Calflora. Retrieved May 24, 2023, from https://www.calflora.org/app/taxon?crn=10428</p> <p>(7) California Native Plant Society. (2023). <i>Arctic Starflower, Lysimachia europaea</i>. Calscape. Retrieved May 24, 2023, from https://calscape.org/Lysimachia-europaea-()</p> <p>(9) Cholewa, A. (2023). <i>SEINet Portal Network - Trientalis europaea</i>. SEINet. Retrieved May 24, 2023, from https://swbiodiversity.org/seinet/taxa/index.php?taxon=Trientalis+europaea</p> <p>(5) Giblin, D. (2023). . Burke Herbarium Image Collection. Retrieved May 24, 2023, from https://www.burkeherbarium.org/</p>
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	<p>imagecollection/taxon.php?Taxon=Lysimachia%20europaea</p> <p>(11) Hiirsalmi, H. (1969). <i>Trientalis europaea</i> L. A study of the reproductive biology, ecology and variation in Finland. <i>Annales Botanici Fennici</i>, 6(2), 119–173. http://www.jstor.org/stable/23724180</p> <p>(2) Integrated Taxonomic Information System. (2023). <i>ITIS - Report: Trientalis europaea</i>. Integrated Taxonomic Information System. Retrieved May 24, 2023, from https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=24054#null</p> <p>(8) Klinkenberg, Brian. (Editor) 2020. <i>E-Flora BC: Electronic Atlas of the Plants of British Columbia</i> [eflora.bc.ca]. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver. [Accessed: 2023-05-24 12:14:37 AM]</p> <p>(10) Plants For a Future. (2023). <i>Trientalis europaea</i> Chickweed Wintergreen, Arctic starflower PFAF Plant Database. Pfaf.org. Retrieved May 24, 2023, from https://pfaf.org/user/Plant.aspx?LatinName=Trientalis+europaea</p> <p>(6) Taylor, K., Havill, D.C., Pearson, J. and Woodall, J. (2002), <i>Trientalis europaea</i> L.. <i>Journal of Ecology</i>, 90: 404-418. https://doi.org/10.1046/j.1365-2745.2002.00644.x</p> <p>(12) UNH Extension. (2019, October 10). <i>When should I dig up dahlia tubers and how should I store them?</i> UNH Extension. Retrieved May 24, 2023, from https://extension.unh.edu/blog/2019/10/when-should-i-dig-dahlia-tubers-how-should-i-store-them</p> <p>(3) University of California. (2023). <i>Trientalis europaea</i> L. Jepson Flora Project. Retrieved May 24, 2023, from https://ucjeps.berkeley.edu/cgi-bin/get_cpn?TREU</p> <p>(1) USDA NRCS National Plant Data Team. (2023). <i>Trientalis europaea</i> L. USDA Plants Database. Retrieved May 24, 2023, from https://plants.usda.gov/home/plantProfile?symbol=TREU</p>
Other Sources Consulted	None.
Protocol Author	Paris Hodgson
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