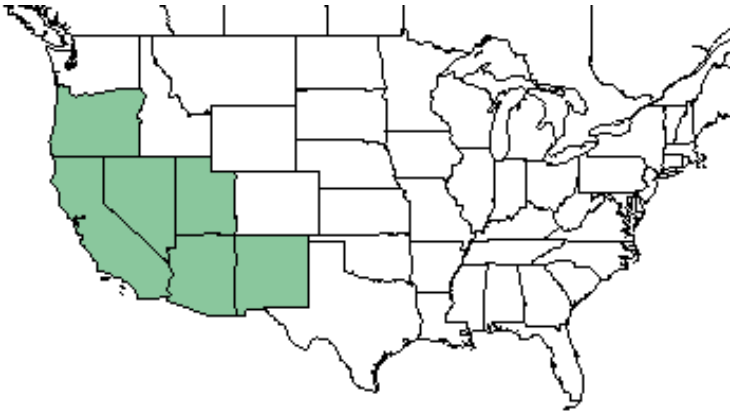
Plant Propagation Protocol for *[Pterostegia drymarioides]*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/*PTDR.pdf*

TAXONOMY	
Plant Family	
Scientific Name	Polygonaceae
Common Name	Buckwheat family or Knotweed family
Species Scientific Name	
Scientific Name	*Pterostegia drymarioides* Fisch. & C.A. Mey.
Varieties	Pterostegia diphylla Nutt. var. biloba Nutt.
Sub-species	N/A
Cultivar	N/A
Common Synonym(s)	Pterostegia diphylla Nutt., Pterostegia microphylla Nutt.
Common Name(s)	Woodland pterostegia, Pterostegia, Granny's hairnet, Fairy bowties, Woodland threadstem, Fairy mist, Woodland wingcup
Species Code (as per USDA Plants database)	PTDR [13]
GENERAL INFORMATION	
Geographical range	 Photo credit: USDA Plants database, *Pterostegia drymarioides* [13]
Ecological distribution	*Pterostegia drymarioides* grows on moist, shaded ground in a variety of ecosystems, including chaparral, western forests, coastal sage scrub, and in well-shaded areas in desert habitats. Occasionally found in oak-pine or montane conifer woodland. [12, 4, 3]
Climate and elevation range	Elevation range is 0-1600meters. [7] Preferred climate is warm places in cool shaded forests or shady chaparral forests. [4]

Local habitat and abundance	This plant grows in well-drained, sandy soils that remain a little moister than the surrounding ground (hence, the need for shade). [14] Pterostegia often grows underneath other plants or under rocks, and is therefore difficult to see; however, it is abundant as a small groundcover species in the states of its range, especially California. [4] It is Globally Secure as well as Locally Secure in its range. [13] PTDR can be associated with such species as sagebrush (*Artemesia*) and other shrub-like plants that help to create shaded microclimates. [4, 3]
Plant strategy type / successional stage	PTDR is a common annual that must reseed to spread. It tolerates some stress. It often needs larger, more established plants to provide shade and moisture, but it is found in greater amounts in disturbed areas with plenty of open space to seed and germinate (eg, after a chaparral fire). [1] It grows in low, spreading patches or delicate vines. [3]
Plant characteristics	PTDR is a low-growing annual forb that spreads in patches over the ground or grows as a small vine with delicate, fan-shaped leaves that are deeply lobed into two sections; it has many delicate branches with slight pubescence on the stem. PTDR often grows as a ground cover in shaded areas beneath other plants. Flowers from March-July with tiny yellow or pink blooms. [3]
PROPAGATION DETAILS	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	N/A
Time to Grow	N/A
Target Specifications	N/A
Propagule Collection Instructions	Seeds are small achenes, ~1.5mm in length, that appear after the plant's flowering period March-July. [4] In late summer and early fall (July-September), the achenes are available for collection. 1000 seed weight is 0.33g. [6]
Propagule Processing/ Propagule Characteristics	N/A
Pre-Planting Propagule Treatments	After cleaning, Pterostegia seeds have been shown to have a high germination rate of near 100% if they have been stratified in low humidity and cold temperatures around -20^{o}C for 26 days. [6] Storage has been successful at 15% relative humidity and cool temperatures. [6]
Growing Area Preparation / Annual Practices For Perennial	Growing media should emulate natural media of sandy, well-drained soils. [4] 100% germination has been achieved with soil amended with 1% agar and air temperatures held between 15 and 20^{o}C. Addition of gibberellic acid (GA3) is not necessary, but has shown to increase germination in a wider range of temperatures (10 to 25^{o}C). Soil should be kept moist but not wet during germination period. [6]

Crops	
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	*Pterostegia* is a monotypic genus [3], and therefore difficult to compare to other plants. However, as an abundant annual, it is likely that in-site seeding, rather than nursery propagation, would be more appropriate for this species in restoration efforts. Pterostegia germination has been shown to be *inhibited* by charate, or charred wood chemicals. [5]
INFORMATION SOURCES	
References	[1] Barbour, M. G., & Billings, W. D. (2000). *North American terrestrial vegetation*. Cambridge University Press. [2] Caldwell, Jeffrey. (2004). *Native Annual Plants of San Francisco, notes for the natural gardener*. http://jeffreycaldwell.blogspot.com/2004/12/native-annual-plants-of-san-francisco.html [3] Encyclopedia of Life. *Pterostegia drymarioides* Fisch. & C. A. Mey; Woodland Pterostegia. http://eol.org/pages/585574/hierarchy_entries/46190236/details

[4] James L. Reveal & Thomas J. Rosatti. (2016). *Pterostegia drymarioides*, in Jepson Flora Project (eds.) *Jepson eFlora*, http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=40273, accessed on May 19, 2016.

[5] Jefferson, L., Pennacchio, M., & Havens-Young, K. (2014). Ecology of plant-derived smoke: its use in seed germination. Oxford University Press. Print.

[6] Kew: Royal Botanic Gardens. *Pterostegia drymarioides*. http://epic.kew.org/searchepic/summaryquery.do?searchAll=true&scientificName=Pterostegia+drymarioides

[7] National Park Service. Santa Monica Mountains National Recreation Area. (2004). Thread Stem. *Pterostegia drymarioides*. http://www.smmflowers.org/bloom/species/Pterostegia_drymarioides.htm

[8] National Park Service. *Pterostegia drymarioides* Fisch. & C. A. Mey. Joshua Tree National Park, California. https://www.nps.gov/jotr/learn/nature/pterostegia_drymarioides.htm

[9] Native Plants: Woodland Threadstem. California State University Channel Islands. http://nativeplants.csuci.edu/pterostegia-drymarioides.htm

[10] NatureServe Explorer. *An online encyclopedia of life*. (2009) Pterostegia drymarioides—Fisch. & C.A. Mey. http://explorer.natureserve.org/servlet/NatureServe?searchName=Pterostegia+drymarioides

[11] Pterostegia drymarioides Fisch. & C. A. Mey. Flora of North America. www.eFloras.org. http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=220011231

[12] University of California, Irvine. School of Biological Sciences. (2005). *Natural History of Orange County, California and Nearby Places*. http://nathistoc.bio.uci.edu/Plants%20of%20Upper%20Newport%20Bay%20(Robert%20De%20Ruff)/Polygonaceae/Pterostegia%20drymarioides.htm

[13] USDA.gov Plants Database. Pterostegia drymarioides Fisch. & C.A. Mey. Woodland pterostegia. http://plants.usda.gov/core/profile?symbol=PTDR

[14] Westman, W. E. (1981). Factors influencing the distribution of species of Californian coastal sage scrub. *Ecology*, 439-455.

[15] Wikipedia the Free Encyclopedia. Pterostegia. (2016). Wikipedia. https://en.wikipedia.org/wiki/Pterostegia

	[16] Young, J. A., & Young, C. G. (1986). *Collecting, processing and germinating seeds of wildland plants*. Timber Press. Print.
Other Sources Consulted	Baskin, C. C., & Baskin, J. M. (1998). *Seeds: ecology, biogeography, and evolution of dormancy and germination*. Elsevier. Griffin, J. R. (1975). Plants of the highest Santa Lucia and Diablo range peaks, California. Jorgenson, Hank. (2007). *Pterostegia drymarioides*. Woodland threadstem. http://snowbirdpix.com/sonoran_desert_plant_page.php?id=2367 Kearney, T. H., & Peebles, R. H. (1960). *Arizona flora*. Univ of California Press. Woodcock, E. F. (1914). Observations on the Development and Germination of the Seed in Certain Polygonaceae. *American Journal of Botany*, 454-476.
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