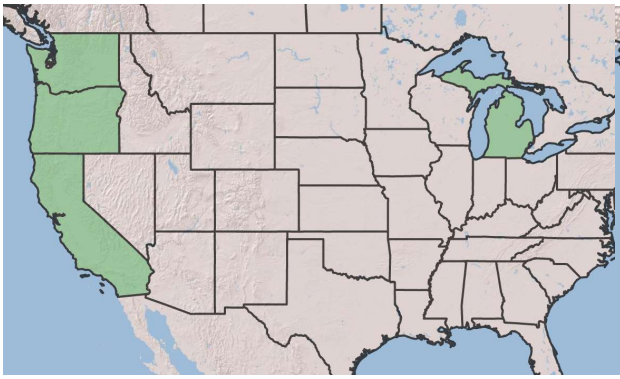
Plant Propagation Protocol for *Trifolium fucatum*
ESRM 412 – Native Plant Production
URL: https://courses.washington.edu/esrm412/protocols/2022/TRFU

USA distribution



Washington distribution

Source: USDA Plant Database

TAXONOMY	
Plant Family	
Scientific Name	Fabaceae[8]
Common Name	Pea family[8]
Species Scientific Name	
Scientific Name	*Trifolium fucatum* Lindl.[8]
Varieties	*Trifolium fucatum* Lindl. var. *virescens* (Greene) Jeps.[8] *Trifolium fucatum* Lindl. var. *gambelii* (Nutt.) Jeps.[8]
Sub-species	None found
Cultivar	None found
Common Synonym(s)	*Trifolium flavulum* Greene[8] *Trifolium gambelii* Nutt.[8]
Common Name(s)	Bull clover[8] Sour clover[4]
Species Code (as per USDA Plants database)	TRFU[8]
GENERAL INFORMATION	
Geographical range	From Washington to California as well as in Michigan. Mostly distributed throughout California and south Oregon.[8]
Ecological distribution	Found in grassy slopes, roadsides, moist fields, brackish areas[7] Disturbed sites[3] Moist, open grassland, marshes, roadsides, occasionally saline or serpentine soils.[9]

Climate and elevation range	Elevation: <1100m[9] Full sun, low moisture[3] 8.8" – 75.0" annual precipitation[3]
Local habitat and abundance	Found in yellow pine forest, foothill woodland, chaparral, valley grassland & wetland-riparian habitats.[4]
Plant strategy type / successional stage	Weedy colonizer, has symbiosis with nitrogen-fixing bacteria in root nodules like many other Fabaceae family plants.[5]
Plant characteristics	Robust annual herb growing a decumbent to erect stem. Leaves are typically oval/rounded leaflets of three with smooth or toothed edges and large stipules. The inflorescence is a head of tiny bilateral pea-flowers.[3,9]
PROPAGATION DETAILS No protocols found for *Trifolium fucatum*, mostly using a protocol found for *Trifolium willdenovi*	
Ecotype	Catalina Island, California[1]
Propagation Goal	Plants[1]
Propagation Method	Seed[1]
Product Type	Container (plug)[1]
Stock Type	Deepot 40 (40 cubic inch)[1]
Time to Grow	4 months[1]
Target Specifications	Firm root plug in container
Propagule Collection Instructions	Grow from seed collected in late summer or fall and planted soon after harvest.[2] Collect seeds during May and June[1]
Propagule Processing/Propagule Characteristics	Dry clover heads in paper bags in a warm dry room. Clean seeds by running plant material through 1/4th inch screen or US Standard#5 sieve to release seeds. Sift product several times with Graimans brand "W" pan (5/64ths) to remove debris, then sift with #25 pan to remove fine debris. Blow product at 25 setting to remove remaining debris. After seeds are cleaned, they're stored under refrigeration in airtight glass containers at 40 F and 40% relative humidity. With 4 collections, seeds average 0.13grams per 100 seeds.[1]

Pre-Planting Propagule Treatments	Seeds can be left inside the legumes/pods and sown directly into the medium.[2] Use 5-minute 5% bleach solution to sterilize seed coats prior to testing or sowing. Scarify seeds by placing them into a 2hr hot water soak, then place them into a 4-week cold, moist stratification at 40F for 4 weeks.[1] Seeds of many *Trifolium* species have hard seed coats that require scarification for gemination. Seeds that are mechanically threshed and cleaned are less likely to be hard than hand collected and threshed seeds.[10] Pre-soak seeds for 12 hours in warm water, then sow in spring[5]
Growing Area Preparation / Annual Practices for Perennial Crops	Irrigate all containers with overhead emitter system in shadehouses and use a drip system or hand water. Native habitat for *trifolium willdenovi*) averages a max & min temperature around 75.4 F and 46 F with an average of 361 frost free days and annual rainfall of 14 inches.[1] Make sure you have a facility to accommodate for climatic differences if you're outside the native range.
Establishment Phase Details	Seeds germinate during late winter and early spring in a shadehouse and remain there for several weeks. Seeds are sown directly into flats filled with a 1in layer of special seed gemination mix 1:1 (v:v) Sunshine Professional Growing Mix and sand on top of 4:1:1 (v:v:v) peat, perlite and organic composted. Osmocote time release fertilizer is incorporated at a rate 1 cup per 0.75 cubic yard of medium. Seeds germinate 2 to 4 weeks after sowing.[1]
Length of Establishment Phase	1 month
Active Growth Phase	After seedlings are well established and have at least 2 true leaves, they're transplanted into Deepot containers (40 cubic inches) filled with a growing medium of 4:1:1 (v:v:v) peat, perlite, and organic compost. Osmocote time release fertilizer is incorporated at a rate of 1 cup per 0.75 cubic yards of medium. After transplanting, seedlings are moved to a different shadehouse with more temperature variance. Plants flower by early May.[1]
Length of Active Growth Phase	3 months
Hardening Phase	No hardening phase is needed since this is an annual species[1]
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	There are Nurseries and seed sources that grow/provide *T. fucatum*, but no protocols are posted online that I could find. *Trifolium willdenovi* is similar to *T. fucatum*
INFORMATION SOURCES	
References	[1]RNGR. (n.d.). *Protocol Information for: Trifolium (willdenovi)*. Reforestation, Nurseries & Genetic Resources. Retrieved May 25, 2022, from https://npn.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=fabaceae-trifolium-3202. [2]Robson, K. A., Richter, A., & Filbert, M. (2008). Trifolium. In *Encyclopedia of northwest native plants for gardens and landscapes*. essay, Timber Press. [3]*Sour clover, trifolium fucatum*. California Native Plant Society. (n.d.). Retrieved May 24, 2022, from https://calscape.org/Trifolium-fucatum-() [4]*Trifolium fucatum Lindl.* Calflora. (n.d.). Retrieved May 24, 2022, from https://www.calflora.org/app/taxon?crn=8075 [5]*Trifolium fucatum sour clover*. Practical Plants. (2013, May 4). Retrieved May 25, 2022, from https://practicalplants.org/wiki/trifolium_fucatum/ [6]*Trifolium fucatum*. California Native Plant Link Exchange. (n.d.). Retrieved May 24, 2022, from http://www.cnplx.info/nplx/species?taxon=Trifolium%2Bfucatum [7]TWC Staff. (2011, April 1). *Trifolium fucatum*. Lady Bird Johnson Wildflower Center Plant Database. Retrieved May 24, 2022, from https://www.wildflower.org/plants/result.php?id_plant=TRFU [8]USDA. (n.d.). *Trifolium fucatum Lindl.* USDA plants database. Retrieved May 23, 2022, from https://plants.usda.gov/home/plantProfile?symbol=TRFU [9]Vincent, M. A., & Isely, D. (2012). *Trifolium fucatum*. The Jepson Herbarium. Retrieved May 24, 2022, from https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=47084

	[10]Young, J. A., & Young, C. G. (1999). Trifolium - Clover. In *Collecting, processing, and germinating seeds of wildland plants*. essay, Timber Press.
Other Sources Consulted	
Protocol Author	Stephen Hao
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