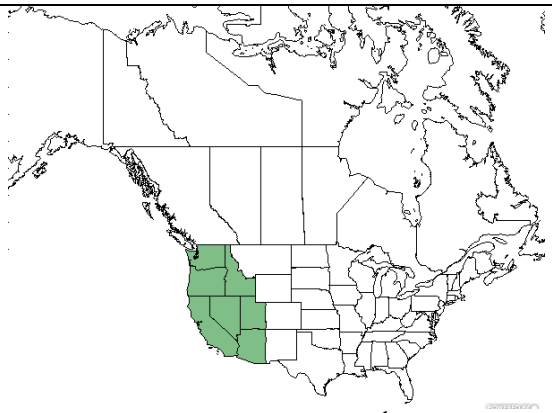
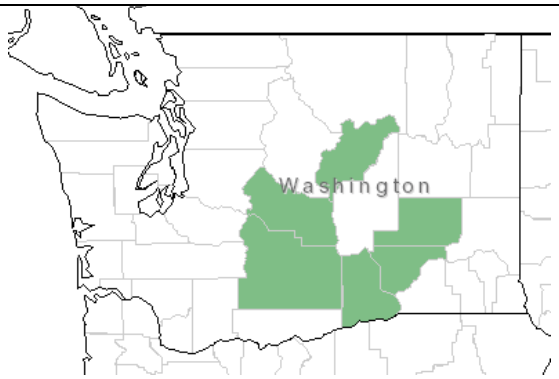
Plant Propagation Protocol for *Sphaeralcea grossulariifolia* (Hook. & Arn.) Rydb.
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/SPGR2.pdf

TAXONOMY	
Plant Family	
Scientific Name	Malvaceae
Common Name	Mallow family
Species Scientific Name	
Scientific Name	*Sphaeralcea grossulariifolia* (Hooker & Arnott) Rydberg
Varieties	N/A
Sub-species	*Sphaeralcea grossulariifolia* (Hook. & Arn.) Rydb. subsp. *grossulariifolia* *Sphaeralcea grossulariifolia* (Hook. & Arn.) Rydb. subsp. *pedata* (Torr. ex A. Gray) Kearney[1,4]
Cultivar	N/A
Common Synonym(s)	N/A
Common Name(s)	Gooseberryleaf globemallow[1], currant-leaf globemallow[2,4,12]
Species Code (as per USDA Plants database)	SPGR2
GENERAL INFORMATION	
Geographical range	 North American Distribution[1]

	 Washington State Distribution (Counties highlighted: Douglas, Kittitas, Yakima, Benton, Franklin, and Adams)[1]
Ecological distribution	Occurs in dry, open or brushy, alkaline, and disturbed areas.[6,10] Grows best in open sites that have undergone a disturbance event including fires. Distributed in salt-desert shrub, sagebrush, pinyon-juniper, mountain brush, and occasionally in ponderosa pine ecosystems. [2]
Climate and elevation range	Dry climates are suitable and tolerates drought conditions.[6] Found at elevations of 2,600 to 7,500 feet (800-2,300m).[2,3]
Local habitat and abundance	Can become well established on disturbed sites and is a dominant species in *Atriplex confertifolia* (shadscale saltbush) communities.[2,12] Other species that share the same habitat and are commonly associated with *S. grossulariifolia* are *Cercocarpus* spp. (mountain mahogany), *Coleogyne ramosissima* (blackbrush), *Atriplex* spp. (saltbush), *Sarcobatus vermiculatus* (greasewood), *Chrysothamnus* spp. (rabbitbrush).[2]
Plant strategy type / successional stage	Gooseberryleaf globemallow is considered to be a pioneer, early-seral, and late seral species.[2] Can tolerate stress and harsh conditions like droughts, erosion, open sites, exposure to full sun, grazing, and some flooding.[2,9,11] It is also a competitive species that can be used to suppress cheatgrass and other unwanted annual species.[11]
Plant characteristics	*S. grossulariifolia* is a perennial forb that has a life span of 2 to 3 years.[2,6] Growth characteristics of *S. grossulariifolia* are that it grows erect and 24 inches tall, it has a grayish or green-gray color with red flowers, it is densely covered with small hairs, and it reproduces from seeds.[10,11] The leaves are also grayish green and have a triangle shape with rounded tips and three lobes that can be either shallow or deep.[5,7] Leaf size varies from 1 to 4 inches wide and as well as long.[11] The flower heads are clustered with red flowers that are up to 1-inch long.[7,11] The fruits are dry and called schizocarps that are composed of 10 to 12 mericarps that hold 1 to 2 seeds each. Schizocarps are truncate or sometimes spherically shaped and the seeds are dark gray or black in color.[7]
PROPAGATION DETAILS	
Ecotype	Seed collected comes from wild populations within the distribution. In Washington, the seed can be collected from multiple population sources (see map of WA distribution above).
Propagation Goal	To produce *S. grossulariifolia* plants ready to be transplanted.
Propagation	Seed propagation

Method	
Product Type	1-gallon container seedling plants
Stock Type	*S. grossulariifolia* seed
Time to Grow	No specific information could be found on the amount of time that it takes to grow from seed to an outplant ready plant.
Target Specifications	Target size of the plant to be produced is based off the goals of a project but examples could be a mature plant or a seedling that is well-established and able to survive at the outplanting site. A plant with a good root system would be desirable trait for *S. grossulariifolia* which is found in dry environments.[11] A good root system could be an established taproot and the presence of the fibrous surface roots.[2]
Propagule Collection Instructions	Collect seed from wild *S. grossulariifolia* plants that have fruits. In order to have good genetic diversity in the produced plants, collect seed randomly from many plants and in different locations. Seeds can also be obtained through a commercial seller of wild seed.[8] The time to collect seeds would be when the plants are flowering and producing fruits which varies depending on location but for Washington it is mid-March to early October.[2]
Propagule Processing/Propagule Characteristics	The approximate seed density per pound is 500,000 seeds.[8,9,10] Seeding rate for *S. grossulariifolia* is 2-4 PLS lbs/acre.[9,10] Seed longevity in storage can be up to 15 years without any noticeable decreases in germination rates.[2]
Pre-Planting Propagule Treatments	Seed cleaning to separate the seeds from the fruit and other plant parts can be done by using a brush machine, air screening equipment, or using a hammer mill.[8] Storage of seeds can be up to 15 years without losing seed viability, the storage conditions should be in an uncooled, unheated, open area with low light exposure.[2] *S. grossulariifolia* seeds have a low germination rate and undergo a strong dormancy. *S. grossulariifolia* seeds are difficult to germinate as the seeds experience a physical and physiological dormancy. Physical dormancy is experienced because of the thick seed coat and physiological dormancy takes place until there is sufficient moisture to stimulate germination. Average germination rates are between 50-60% in controlled settings and stratification is needed in order for seeds to germinate.[2] Mechanical scarification can be used but needs to be done carefully as the seed is easily damaged which decreases germinaiton.[2] Chemical scarification has also been used with a 10 minute soak in 18M sulfuric acid.[8] A 1-3 month stratification period is also needed to overcome physiological dormancy and allow for germination. Best germination rates are obtained from using both scarification and a 6-week cold stratification period.[2,8]
Growing Area Preparation / Annual Practices for Perennial Crops	Seeds should be sown into a weed-free seed bed, a flat in a greenhouse, or something similar where the plants can become established before outplanting. The growing media should be similar to conditions that are experienced in the plant's natural habitat which are alkaline or volcanic soils with moderate salinity.[2]
Establishment	*S. grossulariifolia* grows during early spring and can grow in response to

Phase Details	drought conditions.[2,11] Plants also mature from June to August. Although seedling survival rate is low, the seedlings that do persist grow quickly, are hearty and mature by the second growing season.[2]
Length of Establishment Phase	Establishment from seeding to germination is dependent upon the scarification and stratification methods used but can take a minimum of about 6 weeks.[8] The length of time until the seedling becomes a mature plant is by the second growing season.[2]
Active Growth Phase	Growth rates of seedlings are considered to be "moderately high" and the time of year where the growth begins is early spring. Plants remain green during the summer and use groundwater resources to acquire water, summer precipitations also contribute to the growth of the plant.[2]
Length of Active Growth Phase	No numerical information on the length of active growth phase could be obtained.
Hardening Phase	The hardening phase from the end of active growth phase to end of the growing season lines up with the local climate and precipitation the plant is exposed to. No direct information could be found but the growth phase is in the spring and the end of growing season is in the fall.[2]
Length of Hardening Phase	Estimated length of 2 months.[2]
Harvesting, Storage and Shipping	Harvesting the seedlings from where they were grown can be done by extracting the plant from the tray or seed bed and potting for storage. Or if the plant is already in a pot then it can be stored and shipped as is to the outplanting site.
Length of Storage	Based off the plant characteristics of *S. grossulariifolia* it can withstand rough environmental conditions and can probably survive a period of time from the transportation from nursery to outplanting but no information on length of storage was available.
Guidelines for Outplanting / Performance on Typical Sites	Guidelines for performance at sites would be the comparison of the plants to the general characteristics documented for the species. A high percentage of seedlings should survive since the species is adapted to grow in disturbed sites. Some plant characteristics to measure performance are the plant reaching a height of about 24 inches, flowering in mid-March up to October, and maturing of the plant and seeds between June and August.[2,3,9]
Other Comments	*S. grossulariifolia* is pollinated by several bee genera and rarely self-pollinates. Gooseberrryleaf globemallow is also thought to be resistant to burning by fires because the above ground tissue can regrow from the carbohydrates stored in the taproot.[2]
INFORMATION SOURCES	
References	1. PLANTS Database. United States Department of Agriculture. Accessed on May 18, 2016 from http://plants.usda.gov/core/profile?symbol=spgr2 2. Tollefson, Jennifer E. 2007. *Sphaeralcea grossulariifolia*. U.S. Department of Agriculture, Forest Service. Accessed on May 20, 2016 from http://www.fs.fed.us/database/feis/plants/forb/sphgro/all.html

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