Plant Propagation Protocol for *Mimulus guttatus*
ESRM 412 – Native Plant Production
URL: https://courses.washington.edu/esrm412/protocols/*2023*/*MIGU.pdf*


Source: Burke Herbarium[5]


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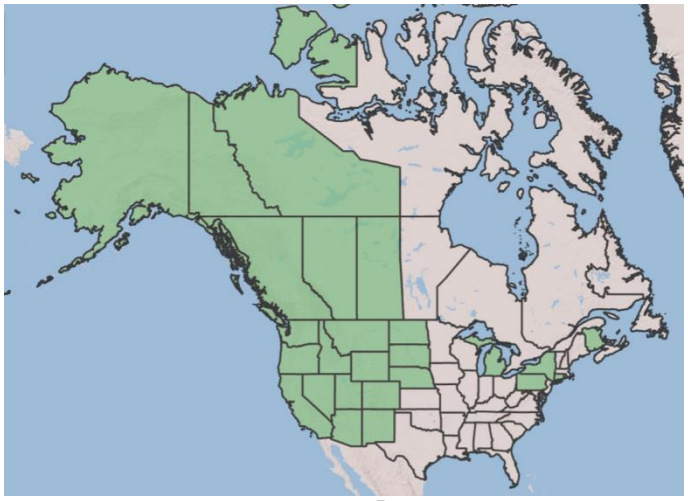
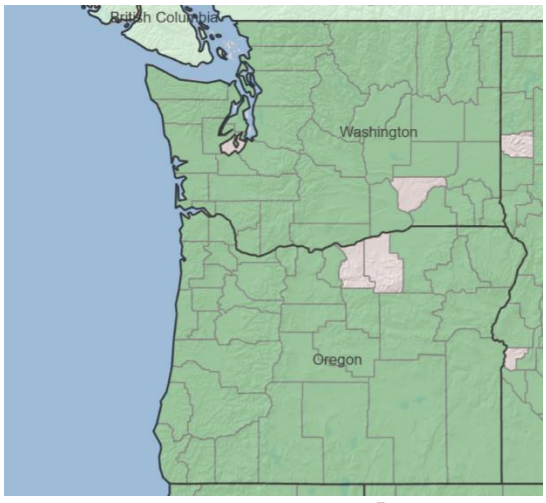
TAXONOMY	
Plant Family	
Scientific Name	Scrophulariaceae
Common Name	Figwort Family
Species Scientific Name	
Scientific Name	*Mimulus guttatus* DC.
Varieties	N/A
Sub-species	N/A
Cultivar	N/A
Common Synonym(s)	*Erythranthe guttata (*Fisch. ex DC.) G.L. Nesom[4] *Mimulus arvensis* Greene *Mimulus bakeri* Gandog. *Mimulus brachystylis* Edwin *Mimulus clementinus* Greene *Mimulus cordatus* Greene *Mimulus cuspidata* Greene *Mimulus decorus* (A.L. Grant) Suksd. *Mimulus equinnus* Greene *Mimulus glareosus* Greene *Mimulus glabratus* Kunth var. *ascendens* A. Gray *Mimulus grandis* (Greene) A. Heller *Mimulus grandiflorus* J.T. Howell *Mimulus guttatus* DC. ssp. *arenicola* Pennell *Mimulus guttatus* DC. ssp. *arvensis* (Greene) Munz

	Mimulus guttatus DC. var. *arvensis* (Greene) A.L. Grant *Mimulus guttatus* DC. var. *decorus* A.L. Grant *Mimulus guttatus* DC. var. *depauperatus* (A. Gray) A.L. Grant *Mimulus guttatus* DC. var. *grandis* Greene *Mimulus guttatus* DC. var. *gracilis* (A. Gray) G.R. Campb. *Mimulus guttatus* DC. ssp. *haidensis* Calder & Roy L. Taylor *Mimulus guttatus* DC. var. *hallii* (Greene) A.L. Grant *Mimulus guttatus* DC. var. *insignis* Greene *Mimulus guttatus* DC. ssp. *litoralis* Pennell *Mimulus guttatus* DC. var. *lyratus* (Benth.) Pennell ex M. Peck *Mimulus guttatus* DC. var. *laxus* (Pennell ex M. Peck) M. Peck *Mimulus guttatus* DC. ssp. *micranthus* (A. Heller) Munz *Mimulus guttatus* DC. var. *microphyllus* (Benth.) Pennell ex M. Peck *Mimulus guttatus* DC. var. *nasutus* (Greene) Jeps. *Mimulus guttatus* DC. var. *puberulus* (Greene ex Rydb.) A.L. Grant *Mimulus guttatus* DC. ssp. *scouleri* (Hook.) Pennell *Mimulus hallii* Greene *Mimulus hirsutus* J.T. Howell *Mimulus laxus* Pennell ex M. Peck *Mimulus langsdorffii* Donn ex Greene *Mimulus langsdorffii* Donn ex Greene var. *argutus* Greene *Mimulus langsdorffii* Donn ex Greene var. *arvensis* (Greene) Jeps. *Mimulus langsdorffii* Donn ex Greene var. *californicus* Jeps. *Mimulus langsdorffii* Donn ex Greene var. *grandis* (Greene) Greene *Mimulus langsdorffii* Donn ex Greene var. *guttatus* (DC.) Jeps. *Mimulus langsdorffii* Donn ex Greene var. *insignis* (Greene) A.L. Grant *Mimulus langsdorffii* Donn ex Greene var. *microphyllus* (Benth.) A. Nelson & J.F. Macbr. *Mimulus langsdorffii* Donn ex Greene var. *minimus* Henry *Mimulus langsdorffii* Donn ex Greene var. *nasutus* (Greene) Jeps. *Mimulus langsdorffii* Donn ex Greene var. *platyphyllus* Greene *Mimulus longulus* Greene *Mimulus luteus* L. var. *depauperatus* A. Gray *Mimulus luteus* L. var. *gracilis* A. Gray *Mimulus lyratus* Benth. *Mimulus maguirei* Pennell *Mimulus marmoratus* Greene *Mimulus micranthus* A. Heller *Mimulus microphyllus* Benth. *Mimulus nasutus* Greene *Mimulus nasutus* Greene var. *micranthus* (A. Heller) A.L. Grant *Mimulus parishii* Gandog., non Greene *Mimulus paniculatus* Greene *Mimulus pardalis* Pennell *Mimulus petiolaris* Greene *Mimulus procerus* Greene *Mimulus prionophyllus* Greene *Mimulus puberulus* Greene ex Rydb. *Mimulus puncticalyx* Gandog. *Mimulus rivularis* Nutt. *Mimulus scouleri* Hook. *Mimulus sookensis* B.G. Benedict, J.L. Modliszewski, A.L. Sweigart, N.H. Martin, F.R. Ganders, & J.H. Willis *Mimulus subreniformis* Greene *Mimulus tenellus* Nutt. ex A. Gray *Mimulus thermalis* A. Nelson *Mimulus unimaculatus* Pennell

Common Name(s)	yellow monkeyflower, golden monkeyflower, seep monkeyflower, common monkeyflower, seep monkeyflower
Species Code (as per USDA Plants database)	MIGU
GENERAL INFORMATION	
Geographical range	Located mostly in the western region of North America and some states in the eastern United States. In the Pacific Northwest, *Mimulus guttatus* is found in nearly every county in Washington and Oregon. See maps below for distribution in North America, Washington state and Oregon state.[7]  Source: USDA Plants Database[7]  Source: USDA Plants Database[7]
Ecological distribution	Wet ledges, crevices, weeping rock faces, seepage areas, along streams, near springs, on gravel bars, in wet ditches and clearings.[8] Indicated as an obligate wetland species in its native range.[5]

Climate and elevation range	Wet places, from sea level to middle elevations in the mountains.[4] Native range receives an annual rainfall ranging from 4.4 in –126.2 in.[9]
Local habitat and abundance	Grows in abundance on both sides of the Cascades in Washington, occurring mostly in wetlands and riparian areas.[4,11]
Plant strategy type / successional stage	Frequently colonizes disturbed areas[2] and can spread quickly.[5] Tolerant of shade and tolerant of extremely wet conditions.[7]
Plant characteristics	An annual herb from fibrous roots or perennial herb from creeping stolons or rhizomes.[8,11] Grows to a height of 10-80 cm.[8] Leaves are oval with toothed edges, and flowers are yellow and trumpet-shaped.[8] After flowers have fallen, many-seeded dry capsules are produced.[8]
PROPAGATION DETAILS	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	10 cu. in. Ray Leach Super cell conetainers
Time to Grow	4 months
Target Specifications	Firmly rooted plug in container. No target height.
Propagule Collection Instructions	Seeds should be collected in July, when the capsules begin to split.[10,12] Mature capsules are brown, and seeds are small and also brown in color. Capsules can be harvested individually, or seeds can be collected from the capsules by shaking the seeds into a container.[10]
Propagule Processing/Propagule Characteristics	Seed density is 4,000,000 seeds/lb.[7] Seeds have a high longevity and can be stored for up to 4 years.[10]
Pre-Planting Propagule Treatments	No seed cleaning is required if seeds were carefully shaken from capsules during collection, but if capsules were harvested individually, then cleaning is required.[10] Capsules should be crushed to release the seed, and then the seed should be cleaned using an air column separator[10] or a screen.[1] No dormancy treatments are required.[10,12]
Growing Area Preparation / Annual Practices for Perennial Crops	Seed can be sown in a greenhouse in Janurary, in 10 cu. in. Ray Leach Super cell conetainers filled with Sunshine Mix #1 (sphagnum peat moss, perlite, dolomite lime) and lightly covered.[10] The conetainers should be watered deeply, so a thin layer of pea gravel can be applied to each conetainer to keep seeds from floating.[10]
Establishment Phase Details	Until germination occurs, the growing medium is kept moist.[10]
Length of Establishment Phase	2-3 weeks
Active Growth Phase	As an obligate wetland species, *Mimulus guttatus* must be kept very wet, so the plants are watered deeply once per day.[10] A water-soluble fertilizer is applied to the plants twice per week.[10]
Length of Active Growth Phase	2 months

Hardening Phase	In late March or early April, plants are moved from the greenhouse into a cold frame.[10] During cool weather, the plants are watered once per day, and during hot weather, the plants are watered twice per day.
Length of Hardening Phase	2 weeks
Harvesting, Storage and Shipping	Total time from sowing to harvest is about 4 months.[10] Seedlings can be stored in a cold frame until planting in late spring or early summer.[6]
Length of Storage	Seedlings can be stored for 3 weeks before planting.[3]
Guidelines for Outplanting / Performance on Typical Sites	*Mimulus guttatus* plants will spread very rapidly, so seedlings do not need to be planted at a very high density.[5] Seedlings should be planted in very wet environments, such as wetlands or riparian areas, because they will grow faster and spread more rapidly if they receive more water.[9] Planting *Mimulus guttatus* in sites with seasonal flooding has been shown to increase population growth through increased seedling survival and recruitment of new individuals.[3] *Mimulus guttatus* flowers will bloom from March to September.[5]
Other Comments	Seeds can be stored for 4 years, but over time the germination rate will decrease.[10] The germination rate for *Mimulus guttatus* ranges from 74% – 80% typically.[10,12]
INFORMATION SOURCES	
References	(1) Barner, Jim. (2007). Propagation protocol for production of Propagules (seeds, cuttings, poles, etc.) *Mimulus guttatus* DC. seeds USDA FS - R6 Bend Seed Extractory Bend, Oregon. In: Native Plant Network. URL: https://NativePlantNetwork.org (accessed 2023/04/28). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. (2) Elderd, B. D. (2003). The Impact of Changing Flow Regimes on Riparian Vegetation and the Riparian Species Mimulus guttatus. *Ecological Applications*, *13*(6), 1610–1625. https://doi.org/10.1890/02-5371 (3) Elderd, B. D., & Doak, D. F. (2006). Comparing the Direct and Community-Mediated Effects of Disturbance on Plant Population Dynamics: Flooding, Herbivory and Mimulus guttatus. *Journal of Ecology*, *94*(3), 656–669. http://www.jstor.org/stable/3879611 (4) Giblin, David. "*Erythranthe Guttata*: Seep Monkey-Flower, Yellow Monkey-Flower." *Burke Herbarium Image Collection*, https://burkeherbarium.org/imagecollection/taxon.php?Taxon=Erythranthe+guttata. Accessed 28 April 2023. (5) "Mimulus Guttatus." *Lady Bird Johnson Wildflower Center - The University of Texas at Austin*, www.wildflower.org/plants/result.php?id_plant=migu. Accessed 29 April 2023.

	(6) "*Mimulus Guttatus*." *Plants for a Future*, pfaf.org/user/Plant.aspx?LatinName=Mimulus%2Bguttatus. Accessed 29 April 2023. (7) "*Mimulus Guttatus* DC." *USDA Plants Database*, https://plants.usda.gov/home/plantProfile?symbol=MIGU. Accessed 28 April 2023. (8) Pojar J., McKinnon A. (1994). *Plants of the Pacific Northwest: Washington, Oregon, British Columbia and Alaska*, B.C. Ministry of Forests and Lone Publishing, Canada. (9) "Seep Monkeyflower." *California Native Plant Society*, calscape.org/Erythranthe-guttata-(). Accessed 29 April 2023. (10) Skinner, David M. (2003). Propagation protocol for production of Container (plug) *Mimulus guttatus* DC plants USDA NRCS - Pullman Plant Materials Center Pullman, Washington. In: Native Plant Network. URL: https://NativePlantNetwork.org (accessed 2023/04/28). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. (11) Stanley, Gerald. "*Erythranthe Guttata*." *Washington Native Plant Society*, https://www.wnps.org/native-plant-directory/168:erythranthe-guttata. Accessed 29 April 2023. (12) Young, Betty. (2002). Propagation protocol for production of Container (plug) *Mimulus guttatus* Fisch. ex DC plants Deepot 40; San Francisco, California. In: Native Plant Network. URL: https://NativePlantNetwork.org (accessed 2023/04/28). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources.
Other Sources Consulted	Hall, M. C., & Willis, J. H. (2006). DIVERGENT SELECTION ON FLOWERING TIME CONTRIBUTES TO LOCAL ADAPTATION IN MIMULUS GUTTATUS POPULATIONS. *Evolution*, *60*(12), 2466–2477. https://doi.org/10.1554/05-688.1 Kiang, Y. T., & Hamrick, J. L. (1978). Reproductive Isolation in the Mimulus guttatus M. nasutus Complex. *The American Midland Naturalist*, *100*(2), 269–276. https://doi.org/10.2307/2424826 "Yellow Monkeyflower." *Flora BC: Electronic Atlas of the Flora of British Columbia*, Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver, linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Mimulus+guttatus. Accessed 29 April 2023.

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