

Plant Propagation Protocol for *Monarda fistulosa*

ESRM 412 – Native Plant Production

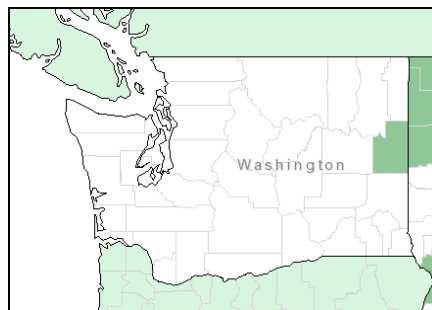
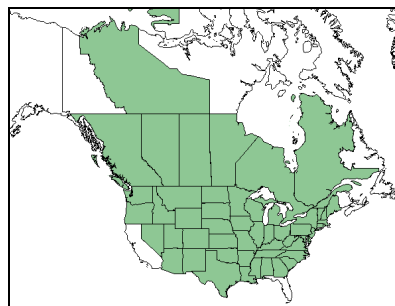
Protocol URL: [https://courses.washington.edu/esrm412/protocols/\[MOFI.pdf\]](https://courses.washington.edu/esrm412/protocols/[MOFI.pdf])



Image: U.S. Fish and Wildlife Service Mountain-Prairie Region

TAXONOMY	
Plant Family	
Scientific Name	Lamiaceae
Common Name	Mint family
Species	
Scientific Name	
Scientific Name	<i>Monarda fistulosa</i> Linnaeus
Varieties	<i>Monarda fistulosa</i> var. <i>brevis</i> <i>Monarda fistulosa</i> var. <i>fistulosa</i> <i>Monarda fistulosa</i> var. <i>longipetiolata</i> <i>Monarda fistulosa</i> var. <i>maheuxii</i> <i>Monarda fistulosa</i> var. <i>menthifolia</i> <i>Monarda fistulosa</i> var. <i>mollis</i> <i>Monarda fistulosa</i> var. <i>rubra</i>
Sub-species	<i>Monarda fistulosa</i> ssp. <i>Fistulosa</i> (Robson, 2008)
Cultivar	
Common Synonym(s)	
Common Name(s)	Wild bergamot, bee-balm, horse-mint, wild oregano
Species Code (as per USDA Plants database)	MOFI
GENERAL INFORMATION	

Geographical range



Images: USDA PLANTS Database

Ecological distribution	<i>M. fistulosa</i> can be found across the U.S. except in Alaska, California, and Florida. (USDA PLANTS Database, 2016) It is generally found in open areas such open woodlands, prairies, fields, and roads. (The Herb Society, 2012)
Climate and elevation range	Low to mid-range elevations
Local habitat and abundance	It prefers semi-shaded to full sun. (The Herb Society, 2012) It is adapted to fine and medium textured soils. (USDA PLANTS Database, 2016)
Plant strategy type / successional stage	Weedy competitor that spreads by clumping rhizomes. (The Herb Society, 2012; Stubbendiek, 1994)
Plant characteristics	<i>M. fistulosa</i> is a highly aromatic, clumping perennial forb that grows between 2' - 4' tall with a 2'-3' spread. (The Herb Society, 2012; Robson, 2008). It produces simple hairy, square stems with gray-green to dark green serrated oval to lance-shaped opposite leaves and blooms during the summer, producing a dense head of lavender or pink, tubular, bilabiate flowers, which then fruit into small nutlets that ripen in the fall. (Anderson, 2003; Plants for a Future, 2016; Robson, 2008)

PROPAGATION DETAILS

Ecotype	Open slope, Glacier National Park, Flathead Co., MT. (Luna, 2001)
Propagation Goal	Plants
Propagation Method	Seed
Product	Container
Stock Type	172 ml conetainer (Luna, 2001)
Time to Grow	6 months (Luna, 2001)
Target Specifications	9 cm high, 6-10 true leaves, roots are firmly grown into the plug (Luna, 2001).
Propagule Collection Instructions	Seeds are ripe 2 months after bloom, and turn black when mature (The Lady Bird Johnson Wildflower Center, 2016; Luna, 2001). Harvest seeds when nutlets turn tan. (The Herb Society, 2012; Gough 2011)
Propagule Processing/Propagule	Each flower produces four nutlets. (Gough, 2011) Seed density is reported as 1,272,500 seeds per pound, with an unknown longevity, and a reported 87% germination rate (USDA PLANTS Database, 2016; Luna, 2001).

Characteristics	
Pre-Planting Propagule Treatments	Seed capsules can be stored in a paper bag in well ventilated drying shed until processing, and then cleaned by a thresher or flailing. (Luna 2001; Gough, 2011). Alternatively, seeds can also be stored in a sealed bag with wet sand or peat moss at 4.4°C for three months. (Anderson, 2003) Seed dormancy is physiological and can have up to a 97% germination rate in the presence of light. (Luna, 2001) Glacier National Park reports a 5-month outdoor stratification period for seeds grown in an outdoor nursery and a 30-day cold moist stratification in a refrigerator for greenhouse grown seeds. (Luna, 2001)
Growing Area Preparation / Annual Practices for Perennial Crops	Seeds can be directly sown on surface. The soil mix can be one-third sand and two-thirds commercial plug mix. (plants.usda.gov) Another trial reported using 70% 6:1:1 milled sphagnum peat, perlite, and vermiculite and 30% sand for the growing media. Fertilizers include Osmocote (13N:13P2O5:13K2O; 8 to 9 month release rate at 21°C) and Micromax (12%S, 0.1%B, 0.5%Cu, 12%Fe, 2.5%Mn, 0.05%Mo, 1%Zn). 1 gram of Osmocote and 0.20 gram of Micromax was used per 172 ml conetainer. Green house temperature during the day is 21°-25°C, and 16-18°C at night. (Luna, 2001) Hand water flats when top of soil is dry to the touch (Anderson, 2003; Luna, 2001).
Establishment Phase Details	Seed easily germinates when lightly covered, in warm conditions. (The Herb Society, 2012) Seeds can be sown mid to late spring in a cold frame, or sown on site in late summer if winters are mild. Germination can occur within 10-40 days at 20°C. (Plants for a Future, 2016) If seeds have not germinated within a month, they can be stratified for a month then returned to 20°C. (Gough, 2011)
Length of Establishment Phase	4 weeks in a greenhouse (Luna, 2001)
Active Growth Phase	Roots and shoots develop quickly after germination, with 4-6 leaves showing 3 weeks after germination. Root tightness was reached in conetainers after 3 months. (Luna, 2001) Tops of plants can be pinched to encourage branching and bushier habit (Anderson, 2003).
Length of Active Growth Phase	12 weeks (Luna, 2001)
Hardening Phase	10-20-20 liquid NPK at 200 ppm fertilizer is used in August and September, with irrigation reduced gradually between September and October. (Luna, 2001)
Length of Hardening Phase	4 weeks (Luna, 2001)
Harvesting, Storage and Shipping	The total time until harvest (in July) is 6 months. <i>M. fistulosa</i> can be overwintered in an outdoor nursery under insulation by foam cover and snow. (Luna, 2001)
Length of	5 months (Luna, 2001)

Storage	
Guidelines for Outplanting / Performance on Typical Sites	Seedlings should be planted about 0.5-2' apart. Watering is recommended until rains arrive. Planting density per acre at minimum should be 2728 and 10912 at maximum. Mowing once a year helps to maintain dieback and other encroaching plants. Large clumps can be divided every 2-3 years in March before sending up shoots to maintain health. (USDA PLANTS Database, 2016). Height at maturation can be 4.9'. (USDA PLANTS Database, 2016)
Other Comments	<i>M. fistulosa</i> has widespread ethnobotanical use among many Native American tribes. (Anderson, 2003) Powdery mildew can be an issue when there is poor air circulation, although it is resistant to mildew. Rust is also a potential problem. (Missouri Botanical Garden, 2016).
PROPAGATION DETAILS	
Ecotype	
Propagation Goal	Cuttings
Propagation Method	Vegetative
Product	Propagules
Stock Type	
Time to Grow	
Target Specifications	
Propagule Collection Instructions	Soft basal shoots should be harvested anytime between May and August when plants are about 8-10 cm tall with plenty of underground stem. (Anderson, 2003; Plants for a Future, 2016)
Propagule Processing/Propagule Characteristics	Lower leaves, flower and/or seed heads should be removed before potting. (Anderson, 2003)
Pre-Planting Propagule Treatments	
Growing Area Preparation / Annual Practices for Perennial Crops	Sand and perlite rooting media can be used for cuttings. (Anderson, 2003)
Establishment Phase Details	Stems can be potted individually and buried until the first node of the stem. (Anderson, 2003) Pots can be kept in light shade in a cold frame or greenhouse. (Anderson, 2003; Plants for a Future, 2016)
Length of Establishment Phase	4-5 weeks (Anderson, 2003)

Active Growth Phase	
Length of Active Growth Phase	
Hardening Phase	
Length of Hardening Phase	
Harvesting, Storage and Shipping	
Length of Storage	
Guidelines for Outplanting / Performance on Typical Sites	
Other Comments	

INFORMATION SOURCES

References	<p>Anderson, M.K. (2003). Plant Guide for Wild Bergamot. Davis, CA: USDA, NRCS, National Plant Data Center c/o Department of Plant Sciences, UC Davis. Retrieved May 24, 2016, from http://plants.usda.gov/plantguide/pdf/es_mofi.pdf</p> <p>Arbury, J. (2004). The complete book of plant propagation. London: Mitchell Beazley.</p> <p>Gough, R. and C. Moore-Gough. (2011). The Complete Guide to Saving Seeds: 322 Vegetables, Herbs, Flowers, Fruits, Trees, and Shrubs. North Adams, MA: Storey Pub.</p> <p>Plants for a Future. (2016). <i>Monarda fistulosa</i> Wild Bergamot, Mintleaf bergamot, Wild Bee-Balm, Lupine PFAF Plant Database. Retrieved May 24, 2016, from http://www.pfaf.org/user/Plant.aspx?LatinName=Monarda fistulosa</p> <p>Lady Bird Johnson Wildflower Center. (2015). NPIN: Native Plant Database. Retrieved May 23, 2016, from http://www.wildflower.org/plants/result.php?id_plant=MOFI</p> <p>Luna, T.; Evans, J.; Wick, D. 2001. Propagation protocol for production of Container (plug) <i>Monarda fistulosa</i> L. plants 172 ml conetainers; USDI NPS - Glacier National Park West Glacier, Montana. In: Native Plant Network. URL: http://NativePlantNetwork.org (accessed 2016/05/20). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries,</p>
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	<p>and Genetic Resources.</p> <p>Missouri Botanical Garden. (2016). <i>Monarda fistulosa</i> - Plant Finder. Retrieved May 24, 2016, from http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=g560</p> <p>Robson, K. A., Richter, A., & Filbert, M. (2008). <i>Encyclopedia of northwest native plants for gardens and landscapes</i>. Portland, Or.: Timber Press.</p> <p>Stubbendieck, J., G.Y. Friisoe, and M.R. Bolick. 1994. <i>Weeds of Nebraska and the Great Plains</i>. Nebraska Department of Agriculture, Bureau of Plant Industry. Lincoln, Nebraska.</p> <p>The Herb Society. (2012). The Herb Society of America's Notable Native 2013 - Wild Bergamot. Retrieved May 23, 2016, from https://www.herbsociety.org/herbs/documents/HSA-MonardafistulosaFactSheetFINAL.pdf</p> <p>USDA PLANTS Database. (2016). Plants Profile for <i>Monarda fistulosa</i> (wild bergamot). Retrieved May 24, 2016, from http://plants.usda.gov/core/profile?symbol=aran7</p>
Other Sources Consulted	
Protocol Author	Jennie Li
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