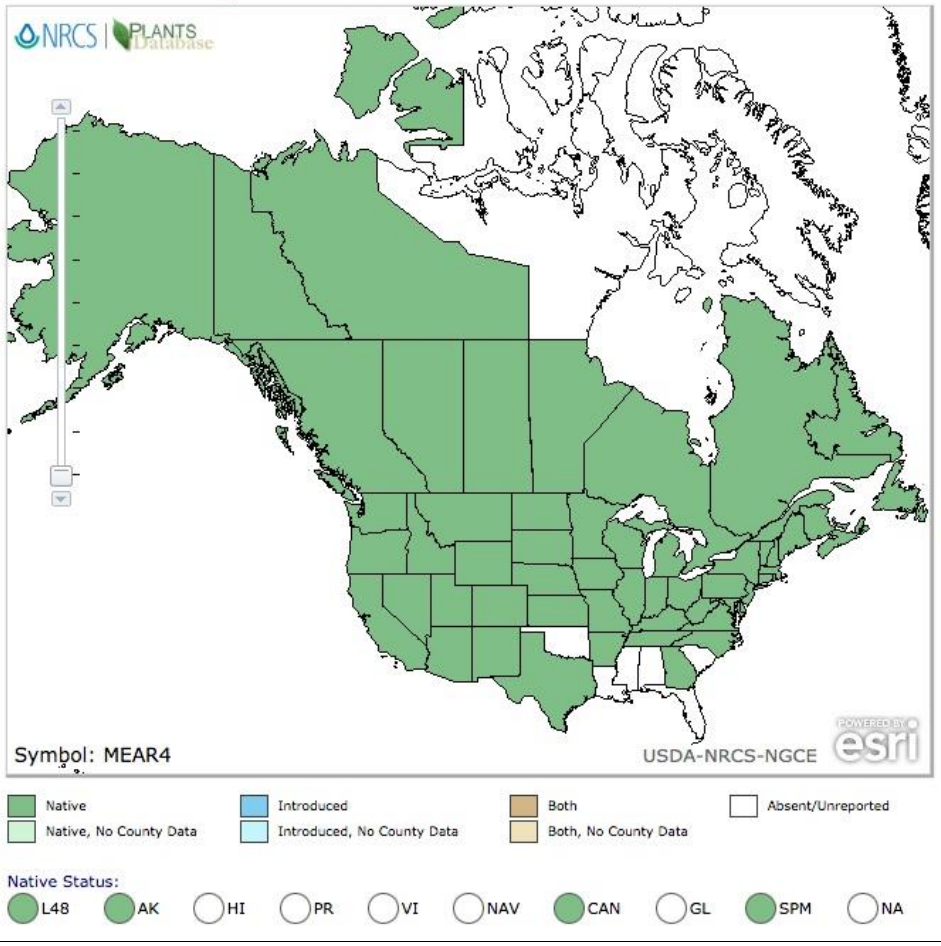
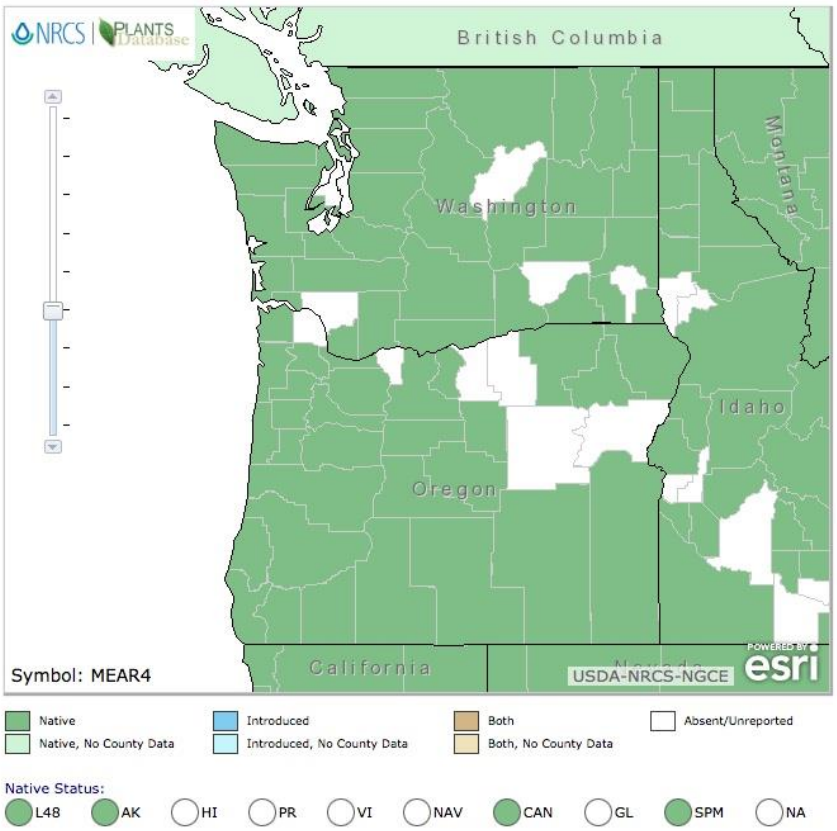
Plant Propagation Protocol for *[Mentha arvensis]*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/*[USDASpeciesCode.pdf]*

[USDA] plants database (10)

TAXONOMY	
Plant Family	
Scientific Name	*Lamiaceae*
Common Name	Mint
Species Scientific Name	
Scientific Name	*Mentha arvensis L.*
Varieties	Varieties of *Mentha arvensis* include: var. *canadensis*, var. *glabrata*, var. *lanata*, var. *sativa*, var. *villosa*
Sub-species	Sub-species of *Mentha arvensis* include: ssp. *Borealis*, ssp. *haplocalyx*, ssp. *parietariifolia*
Cultivar	
Common Synonym(s)	*Mentha arvensis* L. ssp. *borealis* (Michx.) Roy L. Taylor & MacBryde *Mentha arvensis* L. ssp. *haplocalyx* Briq. *Mentha arvensis* L. ssp. *parietariifolia* (Becker) Briq. *Mentha arvensis* L. var. *canadensis* (L.) Kuntze *Mentha arvensis* L. var. *glabrata* (Benth.) Fernald *Mentha arvensis* L. var. *lanata* Piper *Mentha arvensis* L. var. *sativa* auct. non Benth. *Mentha arvensis* L. var. *villosa* (Benth.) S.R. Stewart *Mentha canadensis* L.

	Mentha gentilis L. *Mentha glabrior* (Hook.) Rydb. *Mentha penardii* (Briq.) Rydb. Mentha austriaca Jacq. Mentha lapponica Wahlenb.
Common Name(s)	Wild Mint, Field Mint, Corn Mint, Japanese Peppermint, Banana Mint
Species Code (as per USDA Plants database)	MEAR4
GENERAL INFORMATION	
Geographical range	*Mentha arvensis* is native to the temperate regions of central and western Asia and Europe, cultivated in tropical regions of Asia, and naturalized in North America (15). *Mentha arvensis* grows in native status throughout North America. and is found in all states of the United States except Oklahoma, Louisiana, Mississippi, Alabama, Florida, South California, and Hawaii. North America Distribution: (10) 

	Washington/Oregon Distribution: (10) 
Ecological distribution	Terrestrial (riverine and temperate forest)
Climate and elevation range	The preferred climate zone of *Mentha arvensis* is temperate climates. The hybrids, including *M. x gracilis*, *M. x dalmatica*and *M. x verticillata*. survive in extreme climates in Finland. *Mentha arvensis* is suitable in USDA Hardiness Zone: 3-8. Generally, lower elevations are best suited for *Mentha arvensis*. (14)
Local habitat and abundance	*Mentha arvensis* is commonly found in edges of marshes, fens, shore meadows, stream banks, and disturbed miscellaneous waste grounds and gardens where there is adequate moisture offering appropriate habitats. (14)
Plant strategy type /successional stage	Weedy/colonizer strategy: can become invasive. (10)
Plant characteristics	Life Form: forb Growth Habit: herb Duration: perennial Foliage Color: green Fruit/Seed Color: brown Bloom Color: white, purple Boom Time: July-September Active Growth Period: Spring Growth Form: single stem Growth Rate: moderate

PROPAGATION DETAILS	
Ecotype	*Mentha arvensis* is a perennial plant which does not produce seeds; Therefore, the ecotype of *Mentha arvensis* reproduces through cuttings (6).
Propagation Goal	The goal of propagation is to develop *Mentha arvensis* seedling production through cuttings so that the plants produced is used to make tea, to flavor foods, as an essential oil, as medicine, and as a repellent to rodents and insects. The goal might also be to produce divisions for further propagation. According to (6), two *Mentha arvensis* seedling production methodologies were developed in terms of both micropropagation and micropropagation cuttings. According to (1) and (2), a new seedling production methodology for *Mentha arvensis* was conducted through nodal explants and clonal propagation.
Propagation Method	Cuttings can be taken, or divisions can be made as almost any part of the roots system can become a new plant rather quickly. Cuttings of *Mentha arvensis* were selected to form mother plants in appropriate environmental conditions (average temperature of 25° C and relative humidity of 60%). Then both micropropagation tests and micropropagation tests (asexual propagation) by cuttings were done in the greenhouse and laboratory (6). New stems from *Mentha arvensis* were collected, trimmed thoroughly at the bottoms, and the sterilized stem explants were inoculated (as single or multiple collections) for the further shoot induction (2).
Product Type	The product type will end up being container plants that can later be outplanted. (6)
Stock Type	Propagules (seeds, cuttings)
Time to Grow	Plants should be started in the spring and outplanted in the summer. (6) Rooted mint cuttings are ready for transplant at 3 to 4 weeks. (13)
Target Specifications	100% rooting for all treatments (6).
Propagule Collection Instructions	Root divisions as small as 3cm long may be taken at any time. Cuttings with the length of 3- 4 inches can be taken from healthy mint plants. (13)
Propagule Processing/Propagule Characteristics	Seeds of the mint family are said to have a density of approximately 400,000 per ounce. (12)
Pre-Planting Propagule Treatments	Stratification is not needed for this species. (11) Sanitary treatments were applied to mother plants for disease control (6).
Growing Area Preparation / Annual Practices for Perennial Crops	Lightweight peat-based rooting media with 20% perlite added for drainage is ideal, but all mints will root in any well-drained medium. A PH between 5 and 7 is best for members of the mint family. Larger cell trays or 3 or 4 inch pots work well for starting mints. (13)

Establishment Phase Details	Divisions establish quickly and seeds germinate quickly. The cuttings were established within 45 days. (6)
Length of Establishment Phase	Cuttings of all mints establish a solid roots system by 3 or 4 weeks. (13) Macrocuttings can be reached within 30 days; microcuttings were reached in 25 days for the obtainment of seedlings.
Active Growth Phase	No data found
Length of Active Growth Phase	No data found
Hardening Phase	No data found
Length of Hardening Phase	No data found
Harvesting, Storage and Shipping	Insect and fungal infestation is required for management and control during the storing process (17).
Length of Storage	Seedlings can be outplanted right after they have become established and hardened off. (6)
Guidelines for Outplanting / Performance on Typical Sites	*Mentha arvensis* will do best if planted where soil remains fairly moist even though this species is more tolerant of dry conditions than other species in the genus. This species is cold hardy to -15° C and grows in soils ranging from sandy to heavy clay. It also grows well in full sun or partial shade. (6)
Other Comments	No data found
INFORMATION SOURCES	
References	(1) Nahida Chishti, A.S. Shawl , Z.A. Kaloo , M.A. Bhat and Phalisteen Sultan. (2006). *Clonal Propagation of Mentha arvensis L. Through Nodal Explant.* Pakistan Journal of Biological Sciences, 9: 1416-1419. [Journal]. [Cited 2019 May 1st] (2) Vineet Soni, Anju Sharma, & Pyare Lal Swarnkar. (2016). *Clonal Propagation And Evaluation Of Peroxidase Activity During In Vitro Rhizogenesis In Mentha arvensis L*. Journal of Plant Development, 23(1), 53-60. [Journal]. [Cited 2019 May 1st] (3) Sievers, A. F., & Lowman, M. S. (1933). *Commercial possibilities of Japanese mint in the United States as a source of natural menthol* (No. 378). US Dept. of Agriculture. [Book]. [Cited 2019 May 1st] (4) Maria Kostka-Rokosz, Yelena Yalli, Lana Dvorkin, Julia Whelan. "Mentha Arvensis Piperascens". *Boston Healing Landscape Project*. Boston University School of Medicine. [Archive]. [Cited 2019 May 1st] (5) Farooqi, A. A., Sreeramu, B. S., & Srinivasappa, K. N. (2005). *Cultivation of spice crops*. Universities Press. [Book]. [Cited 2019 May 1st]

(6) Vacca-Molina M, Velásques J.D, Bonomo M.L.C, & Avilés Z.J. (2015). *Menta (Mentha arvensis L.) micro and macropropagation*. Revista Bio Ciencias, 3(3), 208-219. [Journal]. [Cited 2019 May 1st]

(7) Pant, B., Kohjyouma, M., Nakajima, S., Ozaki, H., & Kohda. (1995). Induction and rapid propagation of shoot primordia of Mentha arvensis L. var. piperascens by shoot tip culture. Natural Medicines, 49(3), 308-311. [Journal]. [Cited 2019 May 1st]

(8) Nemeth, E., & Pham, T. (1995). *Vegetative Propagation Of 4 Species Of Mentha*. Gartenbauwissenschaft, 60(1), 34-37.

(9) Zheljazkov, V., Yankov, B., & Topalov, V. (1996). *Comparison of three methods of mint propagation and their effect on the yield of fresh material and essential oil.* The Journal of essential oil research, 8, 35-45. doi: 10.1080/10412905.1996.9700551

(10) [USDA] plants database. *Plants Profile for Mentha arvensis* [Internet]. [Cited 2019 May 1st] available from http://plants.usda.gov/java/profile?symbol=MEAR4

(11) Garden guides. *Wild Mint Plant Information* [Internet]. [Cited 2019 May 1st] available from http://www.gardenguides.com/plants/plant.asp?symbol=MEAR4

(12) Dr. Leonard Perry. *Mentha* [Internet]. [Cited 2019 May 1st] Available from http://pss.uvm.edu/pss123/hermint.html

(13) Conrad Richter. *Success with Mints* [Internet]. [Cited 2019 May 1st] Available from http://www.richters.com/newdisplay.cgi?page=MagazineRack/Articles/mint.html

(14) Illinois Wildflowers. Field Mint - *Mentha arvensis* [Internet]. [Cited 2019 May 1st] available from http://www.illinoiswildflowers.info/prairie/plantx/wild_mintx.htm

(15) USDA, Agricultural Research Service, National Plant Germplasm System. 2019. Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. [Internet]. [Cited 2019 May 1st] Available from https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?id=24069

(16) Tropicos.org. Missouri Botanical Garden. *Mentha arvensis L.* [Internet]. [Cited 2019 May 1st] Available from http://www.tropicos.org/Name/17600151

(17) Akram, Muhammad & Uzair, M & Shamshad Malik, Nadia & Mahmood, Arshad & Sarwer, Naila & Madni, Muhammad Asadullah & Asif, Muhammad.

	(2011). Mentha arvensis Linn.: A review article. Journal of medicinal plant research. 5. 4499-4503. [Journal]. [Cited 2019 May 1st]
Other Sources Consulted	Robert Freckman Herbarium University of Wisconsin http://wisplants.uwsp.edu/scripts/detail.asp?SpCode=MENARVvCAN Cofrin Center for Biodiversity University of Wisconsin Herbarium Wetland plants. http://www.uwgb.edu/biodiversity/herbarium/wetland_plants/menarv01.htm Jepson Manual Treatment for Mentha Arvensis. http://ucjeps.berkeley.edu/cgibin/get_JM_treatment.pl?4745,4779,4780
Protocol Author	Yun Liu
Date Protocol Created or Updated	05/01/2019

Native Plant Protocol

TAXONOMY	
Family Names	
Family Scientific Name:	*Lamiaceae*
Family Common Name:	Mint
Scientific Names	
Genus:	*Mentha*
Species:	*Arvensis*
Species Authority:	L.
Variety:	
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	
Common Synonym(s)	
Genus:	*Mentha*
Species:	*canadensis, gentilis, glabrior, penardii*
Species Authority:	L. for *canadensis* and *gentilis*. *Glabrior's authority is* (Hook) Rydb. and *penardii's* authority is (Briq.) Rydb.
Variety:	Varieties of *Mentha Arvensis* include: var. *Canadensis*, var. *glabrata*, var. *lanata*, var. *sativa*, var. *villosa*
Sub-species:	Subspecies of *Mentha Arvensis* include: ssp. *borealis* and ssp. *haplocalyx*
Cultivar:	
Authority for Variety/Sub-species:	Authority for var. *canadensis* (L.) Kuntze Authority for var. *glabrata* (Benth) Fern Authority for var. *lanata* Piper Authority for var. *sativa* auct. non-Benth [misapplied] Authority for var. *villosa* (Benth) S.R. Stewart Authority for ssp. *borealis* (Michx.) Taylor & MacBryde Authority for ssp. *haplocalyx* Briq.
Common Name(s):	Field Mint, Wild Mint
Species Code (as per USDA Plants database):	MEAR4
GENERAL INFORMATION	
General Distribution (geographical range (states it occurs in),	*Mentha arvensis* grows throughout the U.S. and is found in all states except Louisiana, Mississippi, Alabama, Florida, Hawaii, and South Carolina.

ecosystems, etc):	
Climate and elevation range	Generally lower elevations are best suited for *Mentha arvensis*. (1) In Utah this ranges from 900 to 2850 meters (4)
Local habitat and abundance; may include commonly associated species	Edges of marshes, fens, lakeshores, moist prairies, and disturbed sites that have adequate moisture provide good habitat. (2) *Mentha arvensis* is commonly found in sedge meadows, calcareous fens , shrub-carrs, alder thickets, in marshes, and along streams and shores. (3)
Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)	*Mentha arvensis* employs a weedy/colonizer strategy and can become invasive. (5)
PROPAGATION DETAILS	
Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	The goal of propagation is most likely to produce plants since the plant is used to make tea, to flavor foods, as an essential oil, as medicine, and as a repellent to rodents and insects. (6) The goal might also be to produce seeds or divisions for further propagation. (6)
Propagation Method (Options: Seed or Vegetative):	Seeds can be sown, cuttings can be taken or divisions can be made as almost any part of the roots system can become a new plant rather quickly. (6)
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	The product type will end up being container plants that can later be outplanted. (6)
Stock Type:	
Time to Grow (from seeding until plants are ready to be outplanted):	Plants should be started in the spring and outplanted in the summer. (6) Rooted mint cuttings are ready for transplant at 3 to 4 weeks. (9)

Target Specifications (size or characteristics of target plants to be produced):	
Propagule Collection (how, when, etc):	Root divisions as small as 3cm long may be taken at any time. (6) Cuttings 3 to 4 inches long can be taken from healthy mint plants. (9)
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	Seeds of the mint family are said to have a density of approximately 400,000 per ounce. (8)
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	Stratification is not needed for this species. (7)
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	Lightweight peat-based rooting media with 20% perlite added for drainage is ideal, but all mints will root in any well-drained medium. A PH between 5 and 7 is best for members of the mint family. (9) Larger cell trays or 3 or 4 inch pots work well for starting mints. (9)
Establishment Phase (from seeding to germination):	Divisions establish quickly and seeds germinate quickly. (6)
Length of Establishment Phase:	Cuttings of all mints establish a solid roots system by 3 or 4 weeks old. (9)
Active Growth Phase (from germination until plants are no longer actively growing):	
Length of Active Growth Phase:	
Hardening Phase (from end of active growth phase to end of growing season; primarily related to the	

development of cold-hardiness and preparation for winter):	
Length of Hardening Phase:	
Harvesting, Storage and Shipping (of seedlings):	
Length of Storage (of seedlings, between nursery and outplanting):	Seedlings can be outplanted right after they have become established and hardened off. (6)
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	*Mentha arvensis* will do best if planted where soil remains fairly moist even though this species is more tolerant of dry conditions than other species in the genus. This species is cold hardy to -15 degrees Celsius and grows in soils ranging from sandy to heavy clay. It also grows well in full sun or partial shade. (6)
Other Comments:	
INFORMATION SOURCES	
References:	(1) Burke Museum. WTU Herbarium Image Collection - *Mentha Arvensis* [Internet]. [Cited 2007 April 20th] available from http://biology.burke.washington.edu/herbarium/imagecollection.php (2) Illinois Wildflowers. Field Mint - *Mentha arvensis* [Internet]. [Cited 2007 April 20th] available from http://www.illinoiswildflowers.info/prairie/plantx/wild_mintx.htm (3) [USGS] United States Geological Survey. Wetland Plants. [Internet]. [Cited 2007 April 20th] available from http://www.npwrc.usgs.gov/resource/plants/mnplant/mear.htm (4) Ramsey R. Digital Atlas of the vascular plants of Utah - *Mentha arvensis*. Utah State University. [Internet]. [Cited 2007 April 20th] available from http://www.nr.usu.edu/Geography-Department/utgeog/utvatlas/family/lami/mear.html (5) [USDA] plants database. Plants Profile for *Mentha arvensis* [Internet]. [cited 2007 April 21st] available from http://plants.usda.gov/java/profile?symbol=MEAR4

	(6) Plants for a Future Database. *Metha Arvensis* [Internet]. [cited 2007 April 21st] available from http://www.ibiblio.org/pfaf/cgi-bin/arr_html?Mentha+arvensis (7) Garden guides. Wild Mint Plant Information [Internet]. [cited 2007 April 21st] available from http://www.gardenguides.com/plants/plant.asp?symbol=MEAR4 (8) Dr. Leonard Perry. Mentha [Internet]. [cited 2007 April 21st] Available from http://pss.uvm.edu/pss123/hermint.html (9) Conrad Richter. Success with Mints [Internet]. [cited 2007 April 21st] Available from http://www.richters.com/newdisplay.cgi?page=MagazineRack/Articles/mint.html
Other Sources Consulted (but that contained no pertinent information):	Robert Freckman Herbarium University of Wisconsin http://wisplants.uwsp.edu/scripts/detail.asp?SpCode=MENARVvCAN Cofrin Center for Biodiversity University of Wisconsin Herbarium Wetland plants. http://www.uwgb.edu/biodiversity/herbarium/wetland_plants/menarv01.htm Jepson Manual Treatment for *Mentha Arvensis*. http://ucjeps.berkeley.edu/cgi-bin/get_JM_treatment.pl?4745,4779,4780 http://www.hort.purdue.edu/newcrop/nexus/Mentha_nex.html http://hortiplex.gardenweb.com/plants/p1/gw1025604.html http://www.botanical.com/botanical/mgmh/m/mints-39.html
First Name of Author:	Travis
Last Name of Author:	Baker
Date Entered or Updated (MM/DD/YY):	04/21/07

 (1)