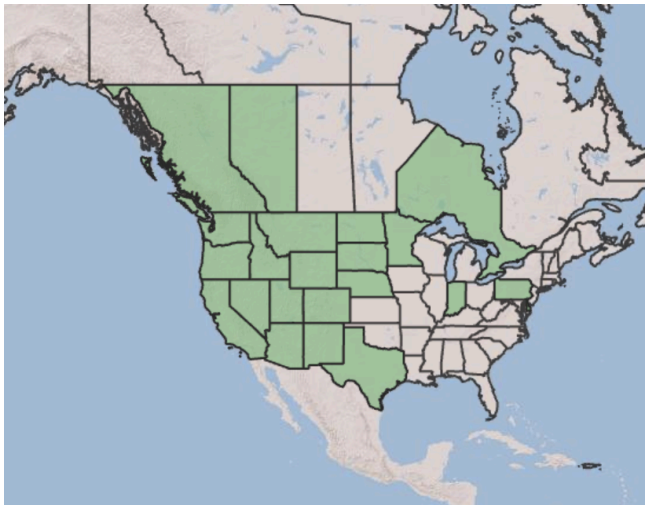
Plant Propagation Protocol for *Mahonia repens*

ESRM 412 – Native Plant Production

URL: https://courses.washington.edu/esrm412/protocols/2026/MARE11.pdf

North American distribution:

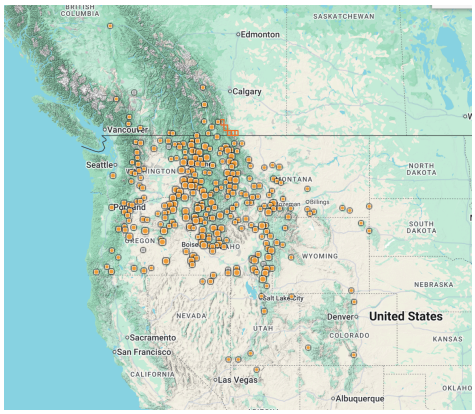


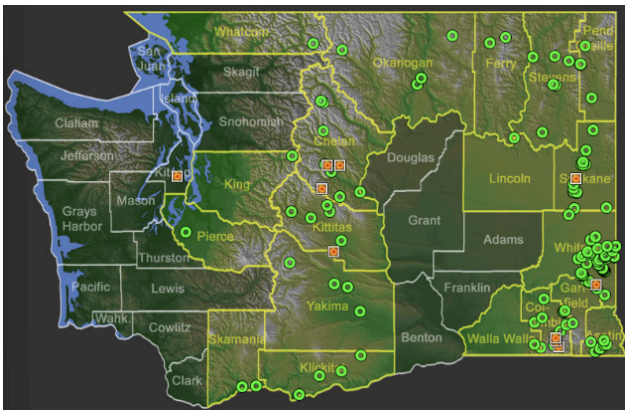
PNW Distribution:

Source: USDA PLANTS Database[12]

North American Observation map[4] (Circles represent areas where one or more specimen have been found [shown left]

Washington Observations[3] (Squares identify locations where photos were taken, circles represent specimen sightings) [shown right]



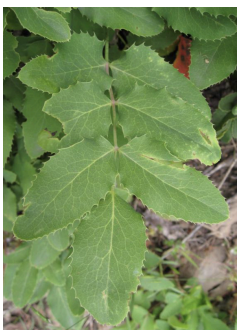


Source: Pacific Northwest Herbaria,[4] Burke Herbarium Image Collection[3]

TAXONOMY	
Plant Family	
Scientific Name	Berberidaceae Juss. [12]
Common Name	Barberry family [12]
Species Scientific Name	
Scientific Name	*Mahonia repens* (Lindl.) G. Don [12]
Varieties	
Sub-species	

Cultivar	
Common Synonym(s)	*Berberis amplectens* (Eastw.) L.C. Wheeler *Berberis aquifolium* Pursh var. *repens* (Lindl.) Scoggan *Berberis nana [3]* *Berberis pumila* Greene *Berberis repens* Lindl. *Berberis sonnei* (Abrams) McMinn *Mahonia amplectens* Eastw. *Mahonia pumila* (Greene) Fedde *Mahonia sonnei* Abrams *Odostemon pumilus* (Greene) A. Heller *Odostemon repens* (Lindl.) Cockerell [12]
Common Name(s)	Creeping barberry [12] Creeping Oregon grape [12]
Species Code (as per USDA Plants database)	MARE11 [12]
Abbreviation used by USDA Fire Effects Information System & Native Plant Network	MAHREP [12]
GENERAL INFORMATION	
Geographical range	Occurs largely east of the Cascades crest in Washington, as well as from British Columbia down to California and east to the Rocky Mountains.[3] North American distribution includes: ● USA: AZ , CA , CO , ID , IN , MN , MT , ND , NE , NM , NV , OR , PA , SD , TX , UT , WA , WY ● Canada: AB , BC, ON ● Native to: Mountains: British Columbia and Alberta south and east through California to the Black Hills, s. to Arizona and west Texas.[7] Distribution maps for North America and Washington above.
Ecological distribution	Grow in dry rocky slopes and open forests in steppe and montane zones.[11] Also common in open forest, shrublands, and grasslands.[6,10] Dry, open woods & hills at high elevations.[7]
Climate and elevation range	Drought-tolerant, but cannot tolerate excessively high heat or drying winds during establishment.[7]

	Found in following climates: xeric continental, Pacific maritime, core maritime, northern and southern continental, and subhumid montane.[13] Tolerates 12 - 140 inches of annual rainfall.[13] Prefers medium moisture levels though can tolerate drought, partial shade, dry soils (well-drained sandy/loamy/chalky/granitic soils) , and is cold tolerant.[7] Low to high elevations depending on conditions (0-2300m) and varying by state[10]: ● Arizona: 5,000- 8,500 feet (1,500-2,600 m) ● California 1,000-7,200 feet (300-2,200 m) ● Colorado 5,500-10,000 feet (1,700-3,100 m) ● Nevada 5,000-10,000 feet (1,500-3,100 m) ● New Mexico 6,500-10,000 feet (2,000-3,100 m) ● Texas 4,500-8,000 feet (1,400-2,400 m) ● Utah 3,600-9,800 feet (1,100-3,000 m)[13]
Local habitat and abundance	Prevalent in PNW areas such as the North Oregon Basin and Range, Blue Wallowa Mountains, Cascades, Columbia Basin, Eastern Cascade Slopes and Foothills, Lava Plains, and Owyhee Uplands.[6, 10] Associated species/ecosystems include: Spruce-cedar-hemlock forest, Aspen-birch, Douglas-fir, Ponderosa pine, Western white pine, Fir-spruce, Hemlock-Sitka spruce, Larch, Lodgepole pine, Western hardwoods, Sagebrush, Chaparral-mountain shrub, Pinyon-juniper, Mountain grasslands, Cedar-hemlock-Douglas-fir forest, Fir-hemlock forest, Mixed conifer forest, Lodgepole pine-subalpine forest, Ponderosa shrub forest, Western ponderosa forest, Douglas-fir forest, Cedar-hemlock-pine forest, Grand fir-Douglas-fir forest, Western spruce-fir forest, Eastern ponderosa forest, Black Hills pine forest, Pine-Douglas-fir forest, Arizona pine forest, Spruce-fir-Douglas-fir forest, Southwestern spruce-fir forest, Juniper-pinyon woodland, Chaparral, Mountain-mahogany-oak scrub, Great Basin sagebrush, Fescue-wheatgrass[13]

Plant strategy type / successional stage	Seral to climax species depending on location in range.[13]
Plant characteristics	Sprawling, procumbent, evergreen shrub growing from a rhizome, stoloniferous, and 15-100 cm tall. Plants spread roughly 3 feet outwards. [3, 7, 10, 11] *Mahonia repens* replicates via rhizomes and seeds, with rapid growth following disturbances.[13] Usually grows 6-10 inches tall in the wild.[7] Plant growth takes place slowly, but it is drought tolerant once established making it useful for recreational ground cover such as yards and gardens.[10] Have been used by Native tribes to treat stomach troubles, dysentery, blood purification, bladder problems, kidney issues, lotion, venereal diseases, and general aches.[6]    *Images of flowers, leaves, and berries above.*[3]

	Leaves are evergreen, alternate, pinnate, have 3-7 leaflets that are oblong to ovate, are longer than they are broad (3-7 cm long and 2-5 cm broad), pinnate nerved from the mid-vein, generally have a glossy surface, glaucous underside, and have 13-43 inconspicuous, spiny teeth.[3,11] This plant's stems are monomorphic, usually lacking axillary shoots, with glabrous twigs, and no spines.[10] Flowers are inflorescences of clustered petals growing on pedicles that grow 3-8 cm long (racemes). Perianth of 5 alternating whorls of 3. Outer bracts 3 are greenish-yellow (2-3 mm), followed by 6 bright yellow 6-8mm whorls (sepals), and inner bright yellow, biloped, and oblong petals. Stamen appear in 6's, opposite to the petals, and filaments have 2 divergent teeth at tip. The flower's stigma is sessile. Flowers are overall yellow. [3,11] Flowering occurs in April - June.[3] Berries are clusters, 8-14mm in diameter, blue, glaucous, and have a few large seeds. They are globose-ellipsoid shaped. These are edible.[11]
PROPAGATION DETAILS: FROM SEED	
Ecotype	Open Lodgepole Forest, West Glacier, Glacier National Park, Flathead County, MT. 1030 meters.[9]
Propagation Goal	Plants[9]
Propagation Method	Seed[9]
Product Type	Container (plug)[9]
Stock Type	172 ml containers[9]
Time to Grow	1 year[9]
Target Specifications	4 cm tall, caliper 4mm, and the root system forms a firm plug in container.[9]
Propagule Collection Instructions	Seeds should be collected in early August when fruit turns dark blue/purple. Seeds are brown at maturity, Fruits should be hand collected in plastic bags and kept under refrigeration until cleaned.[9]
Propagule Processing/Propagule Characteristics	Seeds are cleaned with maceration using Dyb-vig seed cleaner at NRCS. Seeds are washed and screened.[9]

	Seed longevity is up to 5 years in dry storage. Dormancy for this species is classified as physiological dormancy.[9] Density: 136,400 seeds/kg % Purity: 100% % Germination: 55 - 80%[9]
Pre-Planting Propagule Treatments	Seeds are soaked in water for 48 hours, and then placed in fine mesh bags buried in moist peat moss for 2 months at 21 degrees Celsius (warm moist stratification) followed by 5 months of cold stratification at 3 degrees Celsius in ventilated containers.[9] Germination is reported to occur over several weeks and is best in a greenhouse held between 13 and 19 degrees Celsius.[9]
Growing Area Preparation / Annual Practices for Perennial Crops	Greenhouse and Outdoor Nurseries Seeds should be directly seeded or germinants planted. Planting germinants is preferred due to the long stratification period. Seeds should be covered in the media.[9] Growing media: 50% 6:1:1 milled sphagnum peat, perlite, and vermiculite and 50% washed sand Osmocote time release fertilizer at the rate of .25 g and Micromax fertilizer at the rate of 0.20 g per 172 ml container.[9]
Establishment Phase Details	Media should be kept evenly moist during germination via twice a day misting. This species germinates over an 8 week period and is best under fluctuating temperatures in the outdoor nursery in the spring. No germination was obtained at greenhouse temperatures of 22 degrees Celsius during the day and 15 degrees Celsius at night.[9] Volume and frequency of fertilization were unspecified.
Length of Establishment Phase	8 weeks[9]
Active Growth Phase	Seedlings develop 4 to 6 true leaves at the active growth stage. Seedlings are fertilized with liquid NPK at 100 ppm during the growing season.[9]
Length of Active Growth Phase	8 weeks[9]
Hardening Phase	Seedlings are fertilized with liquid 10-20-20 NPK at 200 ppm for 2 to 4 weeks prior to outplanting.[9] It is odd to utilize more fertilizer at this growth stage but

	according to the protocol being referenced here this was what was done.
Length of Hardening Phase	2 - 4 weeks[9]
Harvesting, Storage and Shipping	Total time to harvest is 1 year and seedlings should be harvested in September. Storage: Seedlings should be winterized outdoors under insulating foam cover and snow.[9]
Length of Storage	5 months[9]
Guidelines for Outplanting / Performance on Typical Sites	
Other Comments	Good species for restoration on roadsides, rangelands, and recreational spaces. Once established, heat and drought tolerant. Berries can supply food for many species of birds/mammals and the foliage can supply food for deer and elk during the winter. Propagates further via rhizomes and layering.[9]
PROPAGATION DETAILS: FROM SEED	
Ecotype	Utah[2]
Propagation Goal	Plants[2]
Propagation Method	Seeds[2]
Product Type	Bareroot (field grown)[2]
Stock Type	2+0[2]
Time to Grow	2 years[2]
Target Specifications	8 inches tall with a root system balancing top growth.[2]
Propagule Collection Instructions	Wild seeds are collected during fall months and are kept separated according to site, elevation, and source.[2]
Propagule Processing/Propagule Characteristics	Seeds are cleaned prior to storage and kept in an air tight container in a seed storage room at temperatures under 0 degrees Celsius.[2]

Pre-Planting Propagule Treatments	Seeds stratified naturally by planting during fall in a thin layer of sand or mulched field beds.[2]
Growing Area Preparation / Annual Practices for Perennial Crops	Soils: Field soils of Taylorsville Sandy clay loam with Cca horizon shallower than 12", Taylorsville sand clay loam variant with Cca deeper than 12",Taylorsville Clay loam variant with Cca horizon shallower than 12" and Taylorsville Clay loam variant with Cca horizon deeper than 12".[2] Field Bed Preparation: Denote and form beds as needed and apply 0-45-0 (N:P:K) in April. 2 to 3 inches of compost are applied to seed beds prior to sowing. Sulfur is applied during May. Fields are cultivated for weeds as needed throughout the growing season.[2] Irrigation: Irrigated with overhead irrigation with 2 inch, movable aluminum pipe that can be moved from field to field each year. The principle water source is from a canyon stream to the north of the site and is good quality water.[2]
Establishment Phase Details	Seeds sown in late September with an Oyjard seed drill at ⅜ inches deep. Seeds covered lightly and irrigated when soils appear to dry out.[2]
Length of Establishment Phase	1 month after emergence in spring.[2]
Active Growth Phase	“Year 1: Fertilization: We apply Morgro 21-0-0 (N:P:K) with the Gandy spreader (setting 18, speed 2 mph, rpm 1100 to 1200) the second week of each month during the growing season; from April to August. We apply fertilizer at the rate of 120 lbs/ac or 80 lbs/acre. We irrigate for at least 45 minutes following all fertilizer applications. This ensures that foliage will not burn and incorporates fertilizer into the root zone. Fertilizer is not applied when foliage is wet. All sulfur and 0-45-0 (N:P:K) applications must be mechanically incorporated since these amendments are not mobile in the soil.[2] Year 2: 2+0 nursery stock is fertilized the second year using the Herd Spreader, since stock is usually too tall the second year to use the Gandy spreader. ROOT PRUNING PROCEDURES:

	Deciduous species are pruned when they are 8 inches tall. Irrigate heavily for 2 to 3 days prior to pruning to saturate the root zone. Set the pruning blade to slightly wrench seedlings as they are pruned. Check pruning depth frequently and adjust as needed. Irrigate for a minimum of 2 hours following root pruning to settle soil back around roots. This step is critical to eliminate post root pruning mortality. Irrigate the field heavily for 2 to 3 days to further settle the soil."[2]
Length of Active Growth Phase	4 months [2]
Hardening Phase	Begins during week 3 of August or when dormancy is induced. No fertilizer should be applied after August 28th. Irrigation frequency and durations shortened and applied only as needed.[2]
Length of Hardening Phase	1 month[2]
Harvesting, Storage and Shipping	Lifting window occurs during early spring (from early February to mid March) of the second year once seedlings have become dormant.[2] Hand lift seedlings after beds have been undercut at 8 inches deep using a lifter.[2] Store seeds in a cooler on stacked pallets between 36-42 degrees Fahrenheit and at 92-98% relative humidity with strong circulation.[2]
Length of Storage	Not listed.
Guidelines for Outplanting / Performance on Typical Sites	Not listed.
Other Comments	Not listed.
PROPAGATION DETAILS: FROM SEED	

Ecotype	"NRCS accession number 9078266, ecotype from Avalanche area of Glacier National Park and NRCS accession number 9081463, ecotype from the Old Faithful Overlook area of Yellowstone National Park".[1]
Propagation Goal	Plants[1]
Propagation Method	Seeds[1]
Product Type	Bareroot (field grown)[1]
Stock Type	3 + 0 bareroot[1]
Time to Grow	3 years[1]
Target Specifications	Not listed.
Propagule Collection Instructions	Fruit collected by hand.[1]
Propagule Processing/Propagule Characteristics	Fruit macerated using a Dybvig T. Float off light seed and debris using water and then spread the seed on kraft paper for 24-48 hours. If necessary, use a fanning mil to remove the chaff.[1] % Germination: 30 - 50% estimated[1]
Pre-Planting Propagule Treatments	Not listed
Growing Area Preparation / Annual Practices for Perennial Crops	Fore bareroot production, rototill seedbed to loosen soil prior to sowing. Firm seedbed using a roller/packer and sow using a belt seeder/drill. Sow seeds at a density producing 6 to 7 plants per linear foot. ~25 seeds per foot. [1] Sowing during fall can result in strong germination the following spring. Seedbeds covered with an excelsior mat to maintain moisture and reduce predation.

	Thanks to the species size, it can be held over a 3+0 stock.[1]
Establishment Phase Details	Not listed.
Length of Establishment Phase	Not listed.
Active Growth Phase	Not listed.
Length of Active Growth Phase	Not listed.
Hardening Phase	Not listed.
Length of Hardening Phase	Not listed.
Harvesting, Storage and Shipping	Bareroot plants are harvested as 2-0/3-0 stock as soon as ground thaws in spring. A U-blade mounted on the rear of a tractor is used to undercut the beds in 2 directions (lengthwise) before using the blade to life the plants.[1] Bundles of 10-25 plants are tied together, trimmed, and then packed in moist sphagnum/peat moss wrapped in plastic. Store in a walk-in cooler at 34-37 degrees Fahrenheit and 80% relative humidity until needed. Ship in heavy wax coated boxes as priority mail early in the week.[1]
Length of Storage	Several weeks in a well maintained cooler.[1]
Guidelines for Outplanting / Performance on Typical Sites	Not listed.
Other Comments	Germination varies widely with ecotypes and seed lots. Relatively easy to grow species.[1]
PROPAGATION DETAILS: VEGETATIVE	

Ecotype	Lodgepole Forest, 1000m elev. West Glacier, Mt[8]
Propagation Goal	Plants[8]
Propagation Method	Vegetative[8]
Product Type	Container (plug)[8]
Stock Type	490 ml containers[8]
Time to Grow	18 months[8]
Target Specifications	7 cm tall, 9mm caliper of main stem, and root system forming a firm plug in container.[8]
Propagule Collection Instructions	Oregon grape propagated via heel, nodal, and tip cuttings. Regeneration via rhizomes is the most prevalent mode of regeneration post-fire or other disturbances.[8] Two types of tip cuttings: Spring Hardwood or Summer Softwood.[8] Hardwood tip cuttings are collected early April to early May.[8] Softwood cuttings collected late May to mid June from healthy and disease free plants growing on the forest margin in 100% sun exposure.[8]
Propagule Processing/Propagule Characteristics	Cuttings are kept moist and refrigerated for 24 hours at 3 degrees Celsius prior to pretreatment.[8]
Pre-Planting Propagule Treatments	Hardwood and softwood tip cuttings cut into 10-15 cm lengths, 0.5-0.7 cm diameters, and with a section of basal wood.[8] ⅓ of the leaves were removed from step-base and it was treated with 1000ppm Domain fungicide rinse for

	2 minutes. Cuttings were then treated with 1000/2000 ppm liquid IBA rooting hormone before being placed in an outdoor mistbed with a 21 degree Celsius bottom heat.[8]
Growing Area Preparation / Annual Practices for Perennial Crops	Outdoor mistbed has automatic and intermittent mist applied for 6 seconds every 6 minutes. Too frequent misting can cause leaf and stem rot. Bottom heat maintained with heating cables 12cm under rooting media.[8] Media: 50% perlite and 50% sand.[8] Mistbed covered in shadecloth during rooting.[8]
Establishment Phase Details	Hardwoods cuttings that were treated with 1000 ppm IBA and had 57 - 80% rooting.[8] Softwood cuttings that were treated with 1000 ppm IBA had 20 -56% rooting.[8] It takes 5-8 weeks before transplanting.[8]
Length of Establishment Phase	8 weeks[8]
Active Growth Phase	Following rooting, cuttings potted into 490 ml containers with “50% 6:1:1 sphagnum peat, perlite, and vermiculite with 50% sand with Osmocote controlled release fertilizer (13N:13P2O5:13K2O; 8 to 9 month release rate at 21C) and Micromax fertilizer (12%S ,0.1%B, 0.5%Cu, 12%Fe, 2.5%Mn, 0.05%Mo, 1%Zn) at the rate of 2 grams of Osmocote and 0.85 gram of Micromax per 490 ml container. Cuttings are grown in the shade house throughout the active growth phase. Care should be given not to overwater rooted cuttings. Allow the media to dry to 50% dry weight between irrigation applications.”[8]
Length of Active Growth Phase	16 weeks[8]
Hardening Phase	Cuttings transferred to full sun exposure during early fall and given 10-20-20 liquid NPK at 200 ppm weekly until mid October. The irrigation is gradually reduced and plants are given one final round of irrigation prior to overwintering.[8]

Length of Hardening Phase	8 weeks[8]
Harvesting, Storage and Shipping	Total time to harvest: 1.6 years Harvest takes place in September.[8] Store by overwintering in an outdoor nursery under insulating foam cover and snow.[8]
Length of Storage	5 months[8]
Guidelines for Outplanting / Performance on Typical Sites	Not listed.[8]
Other Comments	*M. repens* is a good revegetation species that is heat and drought tolerant. Considered a climax dominant species and established in shade and sun. Berries can provide food for many bird species, and deer/elk browse leaves during the winter.[8]
PROPAGATION DETAILS: VEGETATIVE	
Ecotype	Ecotype from the Old Faithful Overlook area of Yellowstone National Park.[5]
Propagation Goal	Plants[5]
Propagation Method	Vegetative[5]
Product Type	Container (plug)[5]
Stock Type	1 or 2 gallon containers[5]
Time to Grow	1 year[5]
Target Specifications	Not specified.
Propagule Collection Instructions	Stem cuttings are collected mid-summer in the Yellowstone National Park because dormant cutting access is limited during winter.[5]

Propagule Processing/Propagule Characteristics	Cuttings should be placed in a ziplock bag moistened lightly with water and stored in a cooler or refrigerator at 34-37 degrees Fahrenheit. Cuttings should be trimmed uniformly.[5]
Pre-Planting Propagule Treatments	Recut the base of a cutting at an angle and wound the base with a 1-inch tangential slice. Treat trimmed cuttings with a broad fungicide, then allow to dry completely. Treat with 1,000-3,000 ppm IBA.[5]
Growing Area Preparation / Annual Practices for Perennial Crops	Use a well drained media incorporating sand, vermiculite, and perlite. Minimal amounts (<20% of total volume) of peat moss can be added for moisture retention and nutrient exchange. Treat the media with a fungicide prior to sticking in the cuttings unless the media had been pasteurized.[5]
Establishment Phase Details	Cuttings are generally well rooted within 12-16 weeks and can be transplanted into a well drained peat-like mix without much shock. When cultivated, the species grows rapidly so effectively to transplant cuttings into 1 or 2 gallon pots. 30 days of greenhouse conditions should be maintained prior to transplanting outdoors. Do not outplant rooted cuttings without overwintering in a coldframe for an entire season.[5]
Length of Establishment Phase	12 - 16 weeks[5]
Active Growth Phase	Not described.
Length of Active Growth Phase	Not specified.
Hardening Phase	Transfer 2 month old plugs that were started in the greenhouse that winter to an outdoor hoophouse in late spring or early summer (“‘finish’ the plants in the hoophouse). Keep the hoophouse well ventilated but not cooled, and the containers exposed to full sunlight for 2-4 weeks early in the season.[5] Cover the hoophouse with a 50% shade cloth until temperatures fall in autumn. Alternatively finish the container plants/cuttings in the greenhouse and transfer them to the shadehouse in late summer for 30-60 days prior to winter.[5]

	Shade should be removed in late summer or early fall.[5] Plants will harden-off gradually. For premature and extreme cold temperatures, utilize a propane heater to keep temperatures over freezing.[5]
Length of Hardening Phase	30 days minimum, 60 days preferred.[5]
Harvesting, Storage and Shipping	Only hand delivered by nursery, but assumed possibility to ship rooted cuttings as dormant stocks similar to bareroot plants.[5]
Length of Storage	Not listed.
Guidelines for Outplanting / Performance on Typical Sites	Not listed.
Other Comments	None specified.
INFORMATION SOURCES	
References	[1]Barner, J. (2008). Propagation protocol for production of propagules (seeds, cuttings, poles, etc.) *Mahonia repens* (Lindl.) G. D. seeds. In Native Plant Network. U.S. Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. https://npn.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=berberidaceae-mahonia-2782 [2]Baskin, J. M., & Baskin, C. C. (2002). Propagation protocol for production of container (plug) Berberis repens Lindl. plants. In Native Plant Network. U.S. Department of Agriculture, Forest Service, National Center for

	Reforestation, Nurseries, and Genetic Resources. https://npn.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=berberidaceae-mahonia-2719 [3]Burke Herbarium Image Collection. (n.d.). *Mahonia repens*. Burke Museum Herbarium. https://www.burkeherbarium.org/imagecollection/taxon.php?Taxon=Mahonia+repens [4]Consortium of Pacific Northwest Herbaria. (n.d.). *Mahonia repens* distribution records. https://www.pnwherbaria.org/data [5]Dreesen, D. (2003). Propagation protocol for production of container (plug) Berberis fremontii plants. In Native Plant Network. U.S. Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. https://npn.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=berberidaceae-mahonia-2783 [6]Flora of North America Editorial Committee. (n.d.). *Mahonia repens*. In *Flora of North America*. http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=233500240 [7]Lady Bird Johnson Wildflower Center. (n.d.). *Mahonia repens*. University of Texas at Austin. https://www.wildflower.org/plants/result.php?id_plant=mare11 [8]Luna, T., Potter, R., Wick, D., & Keating, R. (2001). Propagation protocol for production of container (plug) *Mahonia repens*(Lindl.) G. Don plants; 490 ml containers. In Native Plant Network. U.S. Department of Agriculture,

	Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. https://npn.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=berberidaceae-mahonia-38 [9]Luna, T., Wick, D., & Hosokawa, J. (2001). Propagation protocol for production of container (plug) *Mahonia repens* (Lindl.) G. Don plants; 172 ml conetainers. In Native Plant Network. U.S. Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. https://npn.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=berberidaceae-mahonia-312 [10]Oregon Flora Project. (n.d.). *Mahonia repens*. Oregon Flora. https://oregonflora.org/taxa/index.php?taxon=3256&synonym=6448 [11]University of British Columbia. (n.d.). *Mahonia repens*. E-Flora BC Atlas. https://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Mahonia+repens [12]U.S. Department of Agriculture, Natural Resources Conservation Service. (n.d.). *Mahonia repens*. U.S. Department of Agriculture Plants Database. https://plants.sc.egov.usda.gov/plant-profile/MARE11 [13]U.S. Forest Service. (n.d.). *Mahonia repens*. Fire Effects Information System (FEIS). https://www.fs.usda.gov/database/feis/plants/shrub/mahrep/all.html

Other Sources Consulted	N/A
Protocol Author	William Fitzgerald
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