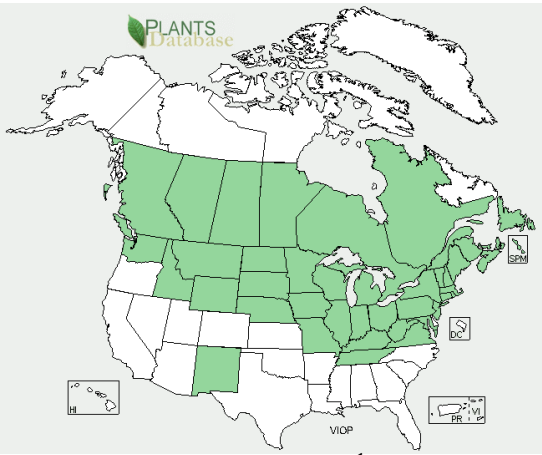
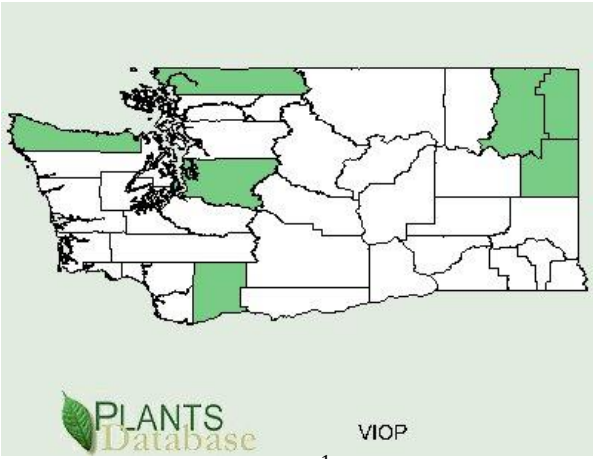
Plant Propagation Protocol for *Viburnum opulus*
ESRM 412 – Native Plant Production



North America Distribution[1]



Washington Distribution[1]

TAXONOMY[1]	
Family Names	
Family Scientific Name:	Caprifoliaceae
Family Common Name:	Honeysuckle Family
Scientific Names	
Genus:	Viburnum
Species:	opulus
Species Authority:	L.
Variety:	
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	
Common Synonym(s) (include full scientific names (e.g., *Elymus glaucus* Buckley), including variety or subspecies information)	*Viburnum opulus* L. var. *opulus* *Viburnum opulus* L. var. *americanum* Aiton *Viburnum opulus* L. var. *sargentii* (Koehne) Takeda
Common Name(s):	European cranberry bush, American cranberry bush (*Viburnum opulus* L. var. *americanum* Aiton), Guelder rose, viburnum, Highbush cranberry[2]
Species Code (as per USDA Plants database):	VIOP
GENERAL INFORMATION	

Geographical range (distribution maps for North America and Washington state)	From Europe, N Africa, central Asia.[3] See maps above for N. America and Washington state distribution.
Ecological distribution (ecosystems it occurs in, etc):	Takes moist to boggy soils.[3] Can be found along swamps, borders of woods and shores, wet roadsides, ditches, banks, and in thickets along rivers, streams and fens.[2]
Climate and elevation range	Found in zones A2, A3, 1-9, 14-24 according to the Sunset zoning method. This includes all western climates and elevations excluding Alaska's coldest zone, Hawaii, and the high, medium, intermediate, or low desert areas of AZ, CA, NV, and NM.[3] Located in codes 1,3,4,5,9 according to the USDA method. This includes the Northeast, North Central, North Plains, Central Plains, and Northwest part of the US. [1]
Local habitat and abundance; may include commonly associated species	In terms of wetlands, the USDA classified the national indicator as being either:[1] FACW Facultative Wetland — Usually occurs in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands. FAC Facultative — Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%). Can be weedy or invasive according to the Wisconsin Dept. of Natural Resources.[4] Endangered in Indiana.[1] Threatened in Ohio.[1] Rare in Pennsylvania.[1]
Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)	Has the ability to resprout.[1] Adapted to fine and medium textured soils. Does not do well in course soils. Tolerates $CaCO_3$. Is shade tolerant.[1] Medium fire and drought tolerance. Low salinity tolerance. Low anaerobic tolerance.[1] *Viburnum opulus var. americanum* is intended for use as a

	windbreak species on organic or wet soils according to the Rose Lake Plant Materials Center. It was selected from a comparative evaluation with 68 other accessions due to its greater overall survival, vigor, foliage abundance, density, and superior uniformity.[6]
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	Can be a tree or shrub.[1] Moderate lifespan. Slow growth rate.[1] Grows between 8-15 feet tall and wide. Has arching braches. Leaves are 2-4 inches long and as wide. Leaves are lobed, maple-like, dark green. Blooms in spring in a 2-4 inch cluster. White flowers. Small fertile blossoms in the center surrounded by larger infertile blossoms. Large, showy red fruit develops in fall and persists through winter.[3]
PROPAGATION DETAILS	
General	
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Plants
Propagation Method (Options: Seed or Vegetative):	*Viburnum opulus* can be propagated from softwood cuttings, hardwood cuttings, and seeds. Softwood cuttings are typically more successful than hardwood cuttings and should be taken from the first flush of growth.[6] If a certain variety or cultivar is desire, propagation from seed is not recommended unless species are adequately separated.[6] It can also be propagated by bare root.[1]
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Propagated by Container.[1]
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	Seed density: 13600 seeds/pound.[1]
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	Seeds exhibit morpho-physiological dormancy.[5] As a result, cold stratification is necessary for

	germination.[1] Seeds should be stratified for 60 to 90 days or about 8 weeks between 20 degrees and 30 degrees C.[5,6]
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	It can be successfully established using 1-0 or 2-0 container-grown stock and following normal planting procedures. It is best to plant in early spring or late fall when plants are dormant. Heaving actions due to frost often lift seedlings from the ground before the roots become established; therefore, on heavy or organic soils where frost heave may become a problem, fall planting is discouraged. Minimum plant-to-plant spacing for windbreaks is 3 to 6 feet, and 12 feet between rows. In wildlife plantings, the spacing should be further apart. Deer browse has not been a limiting factor.[6]
Propagation protocol for production of container *Viburnum opulus* L. as done by Jan Schulz, Patty Beyer, and Julie Williams[2]	
Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	Seed was collected from the eastern central Upper Peninsula in Marquette, Michigan.
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Plants
Propagation Method (Options: Seed or Vegetative):	Seed
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Container (plug)
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	Seed should be removed from the pulp soon after picking. Possible methods include: stripping off by hand, running very lightly in a blender, or rubbing the berry on a sieve and floating of the pulp. Seeds then should be dried for 1 week. Then begin stratification.
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	Stratification: mix an equal amount of seeds with either perlite or vermiculite in a Ziploc-style bag or a Rubbermaid-style container. Add a small amount of water. Not enough to be visible in the bag or container. Place bag or container in a refrigerator or cool area for at least three months. The area must be between 33-42 degrees F. Cold store until planted. Seeds can last in storage for up to three years.

Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	The propagation environment was in a greenhouse with film made of Standard U.V. 3 HL Clear 6 mil (J.R. Johnson's Greenhouse Supply Inc.) Fans were run continuously to supply good air circulation. Vents were kept open during summer months for cooling. They found that *V. opulus* grows best in a 24 cell, 2 inch diameter, 14"x8.5"x4" deep flats, and other flats with 2" diameter or more and depths of 4" or more. The sowing media they used was Scotts Redi-earth Plug and Seedling Mix. This contains vermiculite, and sphagnum peat moss. Soil should be sterile. Preparation: moisten the soil thoroughly with water, using a trowel to mix it in completely. Cover the holes in the bottom and sides of the cells with newspaper to prevent the soil from falling through. Then, fill the cells with the damp soil and press it down. A spoon is recommended for this. Fill the plugs to the top again, without pressing it down. Water the soil. Plant the seeds by hand placing approximately one seed in each small cell and two seeds in each cell with a diameter that exceeds 2.5 inches. Cover the seeds with a thin layer of soil or gently press the seeds down in the already placed soil. Sowing year round is recommended due to unpredictable germination.
Establishment Phase (from seeding to germination):	The greenhouse temperature was set to 65 degrees F both day and night continuously from January until August. During the day in the summer, ambient greenhouse temperatures could reach up to 100 degrees F. Then from September until December, the thermostat was kept at 55 degrees F. During that part of the season, temperatures in the greenhouse could reach 75 degrees during the day. The greenhouse held plants at all stages of growth. This setting stays the same for all plants, at all stages. The soil was kept consistently damp during germination. It was watered using a fine mist or a light hose setting. Newly planted trays were placed on the south side of the greenhouse. No artificial light was used.
Active Growth Phase (from germination until plants are no longer actively growing):	During this phase, the soil does not need to be kept consistently moist. The trays were moved to the north greenhouse to be kept cooler. Fertilization is not used.
Hardening Phase (from end of active	In early to late spring, the mature plants can be moved

growth phase to end of growing season; primarily related to the development of cold-hardiness and preparation for winter):	into a cold frame. This requires a cover of material that diffuses sunlight to prevent scorching or sunburning the plants. When frost no longer presents a problem, the plants are moved outside. They are watered less frequently.
Harvesting, Storage and Shipping (of seedlings):	In the Upper Peninsula, the flats can be planted from late May to early October. Flats that are not planted in the summer will remain in the greenhouse for another season.
Other Comments (including collection restrictions or guidelines, if available):	Grows fairly readily and quickly.
INFORMATION SOURCES	
Protocol Author (First and last name):	Hannah Harper
Date Protocol Created or Updated (MM/DD/YY):	04/20/2010

References:

[1]"*Viburnum opulus* L." The PLANTS database. USDA, NRCS. 20 April 2010. <http://plants.usda.gov/java/profile?symbol=VIOP>.

[2] Schulz, Jan, Patty Beyer, and Julie Williams. "Propagation Protocol for Production of Container *Viburnum opulus* L. Plants." *Native Plant Network*. 2001. Web. 20 Apr. 2010. <http://www.nativeplantnetwork.org/Network/ViewProtocols.aspx?ProtocolID=1556>.

[3] Brenzel, Kathleen Norris. *Sunset Western Garden Book*. Menlo Park, CA: Sunset Pub., 2007. Print.

[4]Hoffman, R. & K. Kearns (eds.). *Wisconsin manual of control recommendations for ecologically invasive plants*. Wisconsin Dept. Natural Resources.

[5]Baskin, Carol C., and Jerry M. Baskin. "Propagation Protocol for Production of Container *Viburnum opulus* L. Plants." *Native Plant Network*. 2002. Web. 20 Apr. 2010. <http://www.nativeplantnetwork.org/Network/ViewProtocols.aspx?ProtocolID=1958>.

[6] *Leelanau Germplasm Highbush Cranberry*. Natural Resources Conservation Services. Michigan: Rose Lake Plant Materials Center, 2002.

Other Sources Consulted:

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