

***Mahonia aquifolium* (Pursh) Nutt.**

Halkomelem (Island): suni'ulhp

Hən̓q̓əmi̓nəm̓ (Island and Downriver): sənayʔəʔp

Ucwal̓mícwts (Lílwat): ts'ól'-ts'əl' (berries); ts'ól'-ts'l'-az' (plant)

English Name: tall Oregon-grape

Family: Berberidaceae (Barberry Family)

Identifying Characteristics:

Mahonia aquifolium is a broadleaf evergreen shrub that grows in a stiffly upright habit and has an oval form. This plant grows from a rhizome to a mature height of 0.5 to 2.5 metres (Douglas et al, 1998), and spreads to 1.5 meters (Figure 1). To differentiate *M. aquifolium* from the other two species of *Mahonia* in BC, look specifically to its leaves, which are much brighter than other leaves and almost look polished or wet. They are ovate-shaped with an acute tip and obtuse base. Leaf margins are dentate to undulate with a distinct wavy shape (Figure 2).



Figure 1. Mature *Mahonia aquifolium* plants.



Figure 2. Flowers and leaves.

The sweetly-fragrant yellow flowers of tall Oregon-grape are very showy, blooming any time in the spring between April and May. In 2019, *M. aquifolium* was in full bloom by April 7th in the Logan Creek woodlands. From late-July onwards, clusters of fruits (Figure 3) ripen and are ready for harvesting when they turn a blue/violet colour. Fruits often have a white “bloom”.



Figure 3. Berry clusters.

Distribution:

On the Pacific Coast, tall Oregon-grape is found on Vancouver Island and distribution continues eastwards across BC into Alberta. Southwards the range includes Washington, Idaho, Montana, and Oregon until the southern limits of its range are met in Northern California (Figure 4).



Figure 4. Distribution of *M. aquifolium*

Habitat:

Tall Oregon-grape is found in mesic to dry open-canopy or closed early successional to climax forests in the lowland and montane zones (Klinka et al, 1989; Douglas et al., 1998) from sea level to 1800 m in BC (Pojar and MacKinnon, 1994). Soils are typically rocky sites with coarse and medium textured, well-drained acidic soils (Pojar and MacKinnon, 1994).

The plant is an indicator of dry to moderately-dry moisture-deficient sites (Klinka et al., 1989; 1996), which makes it a useful summer drought-tolerant species. As an understory and edge species, this plant also tolerates partial shade. On the KPU Langley campus they have been planted in the upland woodland edge areas of the Logan Creek Integrity Project.

Klinka et al (1996) classified coastal BC plant communities and noted that *M. aquifolium* occurs on the open woodland sites with very poor to medium soil nutrient and moisture regimes. The tree canopy is often discontinuous because of the rock outcrops and pockets of shallow soil, which allows Garry oak (*Quercus garryana*) to dominate. Where mature forest stands are dominated by Douglas-fir (*Pseudotsuga menziesii*) and arbutus (*Arbutus menziesii*), the shrub layer contains ocean-spray (*Holodiscus discolor*), dull Oregon-grape (*Mahonia nervosa*), and baldhip rose (*Rosa gymnocarpa*), with *M. aquifolium* and saskatoon (*Amelanchier alnifolia*) present in minor amounts. The herb layer can include Columbia brome (*Bromus vulgaris*), purple peavine (*Lathyrus nevadensis*), western trumpet honeysuckle (*Lonicera ciliosa*), Alaska oniongrass (*Melica subulata*), broad-leaved starflower (*Trientalis latifolia*), white fawn lily (*Erythronium oregonum*), Pacific sanicle (*Sanicula crassicaulis*), cleavers (*Galium aparine*), and trailing blackberry (*Rubus ursinus*). Common mosses are Oregon beaked moss (*Kindbergia oregana*), electrified cat's-tail moss (*Rhytidiadelphus triquetrus*), and step moss (*Hylocomium splendens*). Some of these associated species have been introduced with *M. aquifolium* to the upland woodlands at Logan Creek.

Pests and Diseases:

M. aquifolium requires acidic soils, and will become chlorotic on high pH soils. Even though the leaves have a waxy coating, the plant is susceptible to foliar desiccation in the winter resulting in

leaf burn or leaf drop, particularly on sunny windswept sites. The stems will be fine, allowing the plant to re-leaf in the spring. If soil conditions are too wet, leaf spots may appear, but otherwise, *M. aquifolium* is relatively pest and disease-free.

Reproduction & Propagation:

Cross-pollination between several adjacent plants is best for higher fruit production, which occurs almost annually (Minore and Rudolf, 2008). This plant can naturally propagate by spreading its stolons underground which then surface nearby via nodes.

Oregon-grape fruits ripen from late-July onwards, producing about 84-95 clean seeds per gram (Rose et al, 1998). Hand pick the fruit, and clean by macerating in water with a kitchen blender and floating off debris and pulp. Or, add boiling water to a bowl of fruit, allow to soak and then mash, floating off or screening debris, pulp, and unfilled seeds. Viable seeds will sink to the bottom of the bowl. As you are harvesting in late-summer, clean seeds can either be stored dry or sown fresh outdoors in the fall in a rodent-proof space covered directly with at least 1mm soil, and a layer of leaf mulch to simulate natural conditions. If consistent cold weather is not anticipated outdoors, place fresh or dry seeds in a breathable bag with moist sterile soil and cold-stratify in the fridge for 90 days at 5°C. Germination may begin in the fridge, otherwise after 90 days, sow as above, and outplant seedlings after two years (Rose et al, 1998).

Vegetative propagation can be done in a number of ways by taking heeled, nodal, and basal hardwood cuttings in the fall from the donor plants. Use IBA rooting hormone on the ends and stick into a 2:1 perlite:sand medium, storing in flats in a cool protected space. Root cuttings have high rates of success if taken in spring. Suckers can be divided in spring with good success.

Wildlife Value:

The fruit is eaten by many birds and animals including, junco, fox sparrow, towhee, cedar waxwing, finch, deer. The foliage is used as protection and cover for many species. The flowers provide pollen and nectar for insects and hummingbirds.

Ethnobotany:

In the Okanagan belief system, *M. aquifolium* was used with the wise to give protection in illness and death (Turner, 2014). As a food, the fruit of *M. aquifolium* is used by many Indigenous Peoples on the Coast and in the Interior part of now-called British Columbia (Kuhnlein and Turner, 1991; Moerman, 2010, Turner, 2014). The Stl'atl'imx peoples from the Pemberton area call it ts'ól'-ts'əl', meaning "bitter/sour". Harvested usually in August, and eaten fresh, or squeezed, mashed and spread out to dry in to cakes for winter food (Turner, 2014). The fruit is also made into jam, jelly, or juice, and traditionally sweetened by mixing with salal (*Gaultheria shallon*) on the Coast or with saskatoon (*Amelanchier alnifolia*) in the Interior (Kuhnlein and Turner, 1991).

The inner bark and roots contain a yellow pigment which is a visual cue indicating the presence of berberine, an important alkaloid. Berberine acts as a dye and is used to stain basket materials. The dye can be extracted by boiling the bark in water (Turner, 2007). The berries can also be used to extract a purple dye (Turner, 2014).

Other plant species containing berberine are used in Chinese traditional medicine and in the Ayurvedic herbal medicine of India. As a medicine, Indigenous peoples of the Northwest Coast drank an infusion or decoction of peeled and chopped root bark as a blood tonic or as a purgative (Turner et al, 1990; Turner, 2014).

Interaction and Human Interest:

The genus *Mahonia* honours the American horticulturist, Bernard McMahon, who lived in Philadelphia and served as a steward of the plant collections of the 1804-1806 Lewis and Clark expedition that travelled across Turtle Island (North America) from Pittsburgh, Pennsylvania westwards across the Rocky Mountains and Continental Divide to the mouth of the Columbia River on the Pacific coast. McMahon was the author of *The American Gardener's Calendar* (1807). Tall Oregon-grape leaves are spikey to touch because they have curved hooks on their margins. The species name *aquifolium* is derived from “acus”, meaning needle, and “folium” meaning leaf.

For landscape use, tall Oregon-grape was introduced into horticulture (England) in 1823, and has since naturalized and become somewhat invasive. It is an attractive tall accent plant, or can be a massed planting, or installed as a screen or hedge. The colours of the different plant parts make it an attractive addition to a garden: shiny bronze foliage, bright yellow flowers, and smooth violet/blue fruit. The texture and wavy leaf margin is also interesting (Bressette, 2015). Human interest in this native plant has resulted in the introduction of several cultivars of *Mahonia aquifolium* for horticultural use.

In the garden, plant under a large tree or in a seasonally shaded garden with moist soil. This plant can grow successfully in USDA hardiness zones 4-8. The plant is very easy to grow and care for as it is tolerant of different conditions such as cold temperatures down to -20°C and summer drought (Bressette, 2015). Cut back 1/3 of older stems to 6” to rejuvenate. There are several cultivars (cultivated varieties):

‘Compactum’ grows 60 to 90 cm tall and 90 to 120 cm wide, USDA zones 5 to 9. Its leaves are bronze-red in spring and turn purple-red in fall.

‘Apollo’ is a shorter variety, growing 45 to 60 cm tall and 150 cm wide, USDA zones 7 to 9. Tolerates coastal gardens, and more sun than the species.

‘Orange Flame’ tolerates full-sun site in USDA zones 5 to 8, and combines orange-bronze new leaves with yellow flowers and deep green mature foliage for showy spring displays.

‘Golden Abundance’ has golden-yellow foliage and also tolerates a full-sun site, coping well with drought in USDA zones 5 to 9.

Tall Oregon-grape juice can be fermented to make wine, it requires blending or a lot of sugar to counter the tartness. *M. aquifolium* berries, bark and roots are a popular natural dye used by contemporary weavers and spinner. The holly-like leaves of Oregon-grape resist wilting, making the plant desirable for wreath-making and floral arrangements.

Recipe: Oregon-grape Jam

Once foraged, the fruits of *M. aquifolium*, can be made into tasty jam. The fruits are perfect for jam recipes as they are high in fiber, pectin, acid, and are very seedy. This recipe is adapted from Ziedrich (2013).

Ingredients:

1.5 kg (about 2 litres) fresh Oregon-grapes
1 litre of water
1 to 1.5 litres sugar
2 tablespoons brandy or orange liqueur

Instructions:

In a large saucepan, add together the Oregon-grapes and enough water to cover. Bring the mixture to a gentle boil, stirring occasionally for about 10 minutes. When the fruit has softened, crush with a potato masher and continue to boil uncovered for 10 more minutes. Then transfer and press the crushed fruit through a sieve, leaving the seeds behind. You should have approximately 1 to 1.5 litres of pureed fruit. Transfer back to a clean saucepan and add in the sugar. Heat the pan over medium heat and stir until all the sugar is dissolved, then raise the heat slowly from medium to high and boil once again. Use the spoon test to see if the jam has set. Dip a cool metal spoon into the boiling mixture and lift the spoon out of the steam so the jam runs off the side. When ready, the drops will become heavier and will drop off the spoon two at a time. When the two drops form together and "sheet" off the spoon, the gelling point has been reached. Remove from heat and stir in either the brandy or orange liqueur. To finish off, transfer the jam into sterilized mason jars, leaving a 1 cm space before closing with a sterilized lid and screw ring. Place the jars upright on a wire rack in a large pot, fill pot with hot water until the jars are covered, and bring the water to a boil for 10 minutes. Remove with tongs and set on counter. As the jars cool, they will vacuum seal with a popping sound. When cool, label, and store in a dark cool place.

References:

Bressette, D. (2015). Tall Oregon Grape, *Mahonia aquifolium*. Retrieved from <http://nativeplantspnw.com/tall-oregon-grape-mahonia-aquifolium/>

Douglas, G.W., Straley, G.B., Meidinger, D.V., and Pojar, J. (editors). (1998). *Illustrated Flora of British Columbia. Volume 2: Dicotyledons (Balsaminaceae Through Cucurbitaceae)*. Victoria, B.C.: Ministry of Environment, Lands & Parks and B.C. Ministry of Forests. Retrieved from Eflora BC <http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Mahonia%20aquifolium&redblue=Both&lifeform=3>

Klinka, K., Krajina, V.J., Ceska, A., and Scagel, A.M. (1989). *Indicator Plants of Coastal British Columbia*. Vancouver: UBC Press.

Klinka, K., Qian, H., Pojar, J., & Meidinger, D. (1996). Classification of Natural Forest Communities of Coastal British Columbia, Canada. *Vegetatio* 125(2), 149-168. Retrieved from <http://www.jstor.org.ezproxy.library.ubc.ca/stable/20048718>

Kuhnlein, H.V., and Turner, N.J. (1991). *Traditional Plant Foods of Canadian Indigenous Peoples: Nutrition, Botany and Use*. Philadelphia: Gordon and Breach Science Publishers.

Minore, D., and Rudolf, P.O. (2008). Berberidaceae—Barberry family; *Berberis L. barberry*, pp. 298-302 in Bonner, F.T., and Karrfalt, R.P., (eds.) (2008). *The Woody Plant Seed Manual*. Agriculture Handbook No. 727. Washington, DC. U.S. Department of Agriculture, Forest Service. 1223 p. Retrieved from <https://www.fs.usda.gov/treesearch/pubs/32626>

Moerman, D.E. (2010). *Native American Food Plants: An Ethnobotanical Dictionary*. Portland, Oregon: Timber Press.

Pojar, J., and MacKinnon, A. (2004). *Plants of Coastal British Columbia including Washington, Oregon + Alaska*. Vancouver: Lone Pine Publishing.

Rose, R., Chachulski, C.E.C., and Haase, D.L. (1998). *Propagation of Pacific Northwest Native Plants*. Corvallis: Oregon State University Press.

Turner, N.J. (1978). *Food plants of British Columbia Indians. Part II. Interior Peoples. Handbook No. 36*. Victoria, BC: Royal BC Museum.

Turner, N.J., Thompson, L.C., Thompson, M.T., and York, A.Z. (1990). *Thompson Ethnobotany: Knowledge and Usage of Plants by the Thompson Indians of British Columbia*. Victoria, BC: Royal British Columbia Museum.

Turner, N.J. (2007). *Plant Technology of First Peoples in British Columbia*. Victoria, BC: Royal BC Museum.

Turner, N.J. (2014). *Ancient Pathways, Ancestral Knowledge Ethnobotany and Ecological Wisdom of Indigenous Peoples of Northwestern North America*. Volumes One and Two. Montreal and Kingston: McGill-Queen's University Press.

Ziedrich, L. (2013). Oregon Grape Jam. Retrieved from <https://agardenerstable.com/2013/07/21/oregon-grape-jam/>

Images:

Figure 1. K. Dunster

Figure 2. K. Dunster

Figure 3. Meggar (2005). Retrieved from

https://commons.wikimedia.org/wiki/Mahonia_aquifolium#/media/File:Mahonia_aquifolium.jpg

Figure 4. K. Dunster