BEST MANAGEMENT PRACTICES FOR

Common Periwinkle

in the Metro Vancouver Region

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Created by: Metro Vancouver, City of Burnaby, and the Invasive Species Council of Metro Vancouver

In partnership with: Diamond Head Consulting

Requested by: The Regional Invasive Species Working Group for the Metro Vancouver region and the City of Burnaby

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July 2024

Contents

Introduction

The impacts of invasive species on ecological, human, and economic health are of concern in the Metro Vancouver region. Successful control of invasive species requires concerted and targeted efforts by many players. This document - "**Best Management Practices for Common Periwinkle in the Metro Vancouver Region**" - is one of a series of species-specific guides developed for use by practitioners (e.g., local government staff, crews, project managers, contractors, consultants, developers, stewardship groups, and others who have a role in invasive species management) in the region. Together, these best practices provide a compendium of guidance that has been tested locally by many researchers and operational experts.

Common periwinkle[1] is a low-growing trailing evergreen plant that was introduced to North America in the 1700s as an ornamental plant (Evergreen, 2015). It is native to northern Spain, western France, and parts of central and southern Europe (Khanavi, Pourmoslemi, Farahanikia, Hadjiakhoondi, & Ostad, 2010). It has escaped cultivation in BC and spread into forests, forming dense groundcover and crowding out native plants.

Common periwinkle is sought by gardeners as a flowering, evergreen groundcover, especially for shady areas. It is available in different varieties, propagated for particular characteristics, such as plant size, leaf colour, and resistance to pests (Landon & Banko, 2005). Common periwinkle is one of the top six invasive plants still sold throughout BC (Invasive Species Council of BC, 2023). Ironically, much of the research conducted on periwinkle worldwide has focused on improving propagation success (Landon & Banko, 2005).

Common periwinkle contains the chemical compound vincamine which is used to treat cancer (Dhyani, et al., 2022) and is found in alternative medicine products for circulatory diseases, hypertension, digestive upset, nosebleeds, bruising, and memory disorders (Khanavi, Pourmoslemi, Farahanikia, Hadjiakhoondi, & Ostad, 2010).

Worldwide there are seven Vinca species (Khanavi, Pourmoslemi, Farahanikia, Hadjiakhoondi, & Ostad, 2010), none of which are native to Canada. Although Vinca minor is the focus of this document, a close relative, Vinca major (also considered invasive locally), is described in detail as it occupies similar habitats in Metro Vancouver and the same management techniques apply.

Academic institutions, government, and non-government organizations continue to study this species in British Columbia. As researchers and practitioners learn more about the biology and control of common periwinkle, it is anticipated that the recommended best management practices will change. This document will be updated to reflect these changes as the information becomes available. Please check metrovancouver.org regularly to obtain the most recent version of these best management practices.

1 Common periwinkle (*Vinca minor*) is also known by the common names Vinca, periwinkle, small periwinkle, lesser periwinkle, dwarf periwinkle, creeping periwinkle, myrtle and small myrtle. It is referred to as 'common periwinkle' in this document.

REGULATORY STATUS

Although common periwinkle is an invasive plant of concern in the Metro Vancouver region, it is not currently regulated anywhere in British Columbia.

IMPACTS

Indigenous Peoples have an intrinsic relationship with the natural world, built on reciprocity and stewardship. Many native plants and animals have cultural and spiritual significance for Indigenous Peoples, in addition to being important food and medicine sources. Indigenous communities in British Columbia have collectively called for invasive species prevention, management, and control due to their impact on infrastructure, the economy, human health, ecosystems, and cultural practices. Further collaboration with Indigenous Peoples will deepen our understanding about the impacts of invasive species, such as common periwinkle, on Indigenous ways of life and our shared environment.

Common periwinkle forms a dense groundcover resulting in extensive mats on forest floors, entangling, displacing, and excluding most other plants (USDA Forest Service, 2006). As well as blocking light, common periwinkle produces allelopathic chemicals that prevent the germination and growth of tree seedlings (Darcy & Burkart, 2002). In riparian areas, common periwinkle can reduce native species richness, abundance, and seedling establishment (Cushman & Gaffney, 2010).

The presence of common periwinkle in forests impacts ground dwelling spider populations, which are important predators of soil microhabitats, suggesting that common periwinkle influences ecosystem-level processes such as decomposition (Bultman & DeWitt, 2008).

REPRODUCTION AND SPREAD

Common periwinkle is sold widely in garden centres as a shade-loving groundcover and once established it is highly competitive (Toronto Master Gardeners, 2021). Yard waste dumping is another source of common periwinkle infestations (Stone, 2009).

Common periwinkle spreads vegetatively by stolons (slender runners that grow horizontally along the ground) that root at the nodes when exposed to moist soil (USDA Natural Resources Conservation Service, 2002). Plant stems and stolons form a dense, tangled mat close to the ground. Commercially, common periwinkle is usually propagated from stem cuttings as it easily roots from stem pieces with single nodes (Landon & Banko, 2005). In aquatic habitats, when common periwinkle stem fragments are transported downstream and then come in contact with soil, they may take root (DiTomaso & Kyser, 2013).

Seeds likely do not contribute to the spread of common periwinkle in North America. References suggest that either common periwinkle produces unfertile seeds, they rarely grow to maturity, or they are rarely produced outside of the native range (Evergreen, 2015; Bean & Russo, 1986; Conservation Halton, 2022; Stone, 2009).

At a common periwinkle infestation, moving the leaves aside reveals a dense mat of stems and stolons

CREDIT: ISCMV

HABITAT AND DISTRIBUTION

Common periwinkle is adapted to mild climates and a range of soil conditions, but it prefers partial shade and ample moisture (USDA Natural Resources Conservation Service, 2002). It grows vigorously in riparian areas and other moist habitats. It also grows in forests, disturbed sites, cemeteries, abandoned home sites, underneath hedges, and along roadsides and trails, but it is most common in gardens and the wildland urban interface (Evergreen, 2015; USDA Forest Service, 2006; Invasive Species Council of BC, 2017).

Common periwinkle is frequently found on Vancouver Island, the Gulf Islands, the Lower Mainland and rarely in southwestern BC (Invasive Species Council of BC, 2017). It is considered invasive across the Eastern United States (USDA Forest Service, 2006) and widespread in California, Washington and Oregon states (Cushman & Gaffney, 2010).

CLIMATE CHANGE ADAPTATION

Climate models predict that the Metro Vancouver region will experience warmer temperatures; a decrease in snowpack; longer dry spells in summer months; more precipitation in autumn, winter and spring; more intense extreme events; and an extended growing season. In the past, our region had an average of 252 days in the growing season. In lower elevations, 45 days will be added to the growing season by the 2050s, and 56 days by the 2080s, resulting in nearly a year-round growing season of 357 days on average. In higher elevation ecosystems the growing season length will increase by 50% to 325 days by the 2080s (Metro Vancouver, 2016). These changes will stress many sensitive ecosystems, increasing their vulnerability to competition from invasive species.

Common periwinkle's climate tolerance outside its native range is not well understood (Stone, 2009), but its ability to survive in a variety of soil conditions and habitats will likely influence its capacity to adapt to future climate changes. It is speculated that this plant may benefit from our future climate in several ways:

- **Extreme weather events:** Although Vinca species may temporarily be impacted by extreme weather conditions such as dry or cold, it can quickly resprout and regain any loss (Bean & Russo, 1986).
- **Drought tolerance:** Vinca species are somewhat drought tolerant (Stone, 2009).
- **Increased precipitation and flooding:** If periwinkle stem fragments are transported by flood waters elsewhere, they may take root in soil downstream (DiTomaso & Kyser, 2013).

With these kinds of competitive advantages, this species is more adaptable than native species in a variety of ecosystems. Its ability to reproduce in multiple ways and ability to spread quickly suggest that it will be able to withstand, and possibly thrive, with changing climate conditions.

Identification

Unless otherwise noted, the following identification information was collected from Evergreen (2015), USDA Forest Service (2006), and Stone (2009).

Lifecycle: Perennial, usually evergreen, trailing and vining groundcover.

Stem: Slender, wiry, hairless, branching, dark green at the base to light green with red tinge towards the end. Stolons grow up to 1 metre long along the ground in any direction away from a node, while flowering stems grow upright and only up to 30 centimetres tall. Upon maturity, the stems become somewhat woody and tough to break. Stems are usually hollow and release a milky fluid when broken (Bean & Russo, 1986).

Leaves: Shiny, thick, dark green, egg or oval shaped, tapering at both ends with edges slightly rolled under, approximately 2.5-4 centimetres long and 1-2.5 centimetres wide; grow in opposite arrangement; leaf. Veins often appear white and some varieties are variegated. The leaves may turn yellow in full sun and high heat. The outermost layer of leaf tissue (cuticle) is waxy.

Flowers: Showy, pale blue to lavender in colour (rarely white), with 5 petals in a pinwheel shape, up to 3 centimetres wide. Flowers grow in the leaf axils (the joint where a leaf attaches to the stem) and are usually solitary. Blooms from March to June and intermittently throughout the summer.

Fruits: Inconspicuous, cylindrical seed pods up to 5 centimetres long, becoming dry and split, releasing 3-5 seeds. Seeds are sparsely produced, and some references suggest they are infertile or rarely grow to maturity. Seed viability is unknown (USDA Natural Resources Conservation Service, 2002).

Roots: Light-coloured, extending 3-8 centimetres (Stone, 2009).

The following photos show common periwinkle plant parts.

Leaves
CREDIT: ISCMV

Opposite leaf arrangement
CREDIT: ISCMV

Pinwheel-shaped flower
CREDIT: ISCMV

Seeds
CREDIT: STEVE HURST, USDA NRCS PLANTS DATABASE, BUGWOOD.ORG

Stolon with stems and roots emerging from nodes
CREDIT: ISCMV

SIMILAR SPECIES

The species most commonly mistaken for common periwinkle are listed below.

NATIVE SPECIES

- **Kinnickinnick/bearberry (*Arctostaphylos uva-ursi*)** is a low-growing and sometimes spreading shrub with reddish-brown peeling bark (Klinkenberg, 2024). It has alternate, evergreen, leathery leaves 1-3 centimetres long; upside-down urn-shaped pinkish-white flowers in clusters; and bright red berries (Klinkenberg, 2024). This plant occurs throughout BC, usually in dry, rocky, exposed forests (Klinkenberg, 2024).
- **Yerba buena (*Clinopodium douglasii*)** is an aromatic perennial trailing plant that grows from a woody rhizome (Klinkenberg, 2024). Like common periwinkle, it can also form mats. Four-angled stems have sparse hairs and grow to 1 metre long. Leave are opposite, egg-shaped with rounded tips and irregularly toothed edges (Klinkenberg, 2024). Conspicuous white tube-shaped flowers grow from leaf axils. It grows in open coniferous forests but is relatively uncommon in the Metro Vancouver region (Klinkenberg, 2024).

NON NATIVE SPECIES

- **Large periwinkle (*Vinca major*)** is a closely related species to common periwinkle (additional information in the text box on the next page).
- **Winter creeper (*Euonymus fortunei*)** is a stout, evergreen shrub available in garden centres. It is a groundcover, but can be shaped by pruning, and if planted beside a wall or other support, it will climb (Okanagan Xeriscape Association, 2024). The leaves are glossy, leathery, and varieties range in colour from bright green to variegated with white and yellow. Some varieties do not flower, and others produce small, green, inconspicuous flowers. It is non-invasive and often recommended as an alternative to invasive groundcovers such as ivy and periwinkle (Invasive Species Council of BC, 2021).
- **Virginia creeper (*Parthenocissus quinquefolia*)** is an evergreen vine that grows as a ground cover and climbs trees and buildings. The leaves are alternate and composed of five leaflets, in palmate arrangement (with leaf stems originating from a single central point), turning bright red in the fall (Canadian Wildlife Federation, 2024). White flowers form in the summer, producing blue fruits in the fall. In Metro Vancouver, this plant has been found invading sensitive dune ecosystems, after escaping from adjacent gardens (Gasior, 2024).

Kinnikinnick

CREDIT: KAEMAT, FLICKR

Yerba Buena

CREDIT: J. MAUGHN, FLICKR

Non-variegated variety of winter creeper

CREDIT: J. H. MILLER, USDA FOREST SERVICE, BUGWOOD.ORG

Virginia creeper

CREDIT: B. KANZE, FLICKR

Vinca major (large periwinkle, big periwinkle, bigleaf periwinkle, greater periwinkle)

Large periwinkle is also an invasive plant of concern in Metro Vancouver. It is less hardy and less widespread in the region compared to common periwinkle, but has the potential to spread in coastal areas of BC (Evergreen, 2015). *Vinca major* is the most problematic *Vinca* species in California and the Eastern United States (Stone, 2009). Both *Vinca* species are available in garden centres in Canada, but common periwinkle may be more commonly sold (Conservation Halton, 2022).

As the common and scientific names imply, *Vinca major* is the larger of the periwinkles, by overall size and size of individual features. It has erect flowering stems 0.25-0.5 metres long and trailing non-flowering stems 1 metre long (Bean & Russo, 1986). The leaves are oppositely arranged and look very similar to common periwinkle, but are larger at approximately 2.5-4 centimetres long and 1-2.5 centimetres wide, and more triangular or heart-shaped (Stone, 2009). Up to four flowers grow from the axil of every other leaf (versus single flowers per axil in common periwinkle) (Bean & Russo, 1986). Large periwinkle flowers are similar in shape and colour to those of common periwinkle, but larger at approximately 4-5 centimetres wide. The Sea to Sky Invasive Species Council has developed an Identification and Comparison Guide for small versus large periwinkle.

Like common periwinkle, large periwinkle can survive in a wide range of light and soil conditions, but it is less tolerant to cold winters and hot, dry weather (Bean & Russo, 1986).

As *Vinca major* is thought to have evolved from *Vinca minor* or a close relative (Bean & Russo, 1986), many references available for invasive *Vincas* should cover both species. For example, the management strategies outlined in this document also hold true for large periwinkle.

Vinca major

CREDIT: ISCMV

Vinca major

CREDIT: ISCMV

Tracking

The provincial government maintains InvasivesBC, an invasive species database, map and mobile data collection application available for use by all land managers, contractors, government agencies and non-profit organizations completing surveys and/or management activities on invasive species in BC. Many agencies, including local governments, have their own internal invasive species inventory and mapping protocols that are used by staff, contractors, and, in some cases, the public. For example, the City of North Vancouver has its own system called AlienMap. Agencies in British Columbia that do not enter data into IAPP are encouraged to check it regularly because it contains public reports and data from other agencies and it is important to consider as much data as possible when making management decisions. The Map Display module of IAPP is publicly accessible.

When carrying out a common periwinkle inventory it is useful to record the following information as it will later inform treatment plans:

- Size and density of infestation;
- Location in relation to the 10 metre Pesticide Free Zone adjacent to water courses;
- Location in relation to other water sources, such as wells;
- Whether it is growing around desired vegetation or structures..

Reporting

Since common periwinkle is widespread throughout the Metro Vancouver region and does not pose an imminent health or safety risk, there is generally little value in reporting individual occurrences.

Common periwinkle blanketing the forest understory in a local park

CREDIT: ISCMV

Prevention and Control Strategies

Effective invasive plant management may include a variety of control techniques ranging from prevention, chemical, manual, mechanical, biological, and/or cultural methods. Each method is described below in order of effectiveness.

STRATEGY COLOUR LEGEND

GREEN: RECOMMENDED

ORANGE: CAUTION

RED: NOT RECOMMENDED OR NOT AVAILABLE

PREVENTION: IMPERATIVE

Prevention is the most economical and effective way to reduce the spread of common periwinkle over the long term.

When working in or adjacent to common periwinkle, it is best to inspect and remove plants, plant parts, and seeds from personal gear, clothing, pets, vehicles, and equipment and ensure soil, gravel, and other fill materials are not contaminated with common periwinkle before leaving an infested area. Plants, plant parts, and seeds should be tarped or bagged before transport to an appropriate disposal site (see Disposal section).

Since common periwinkle invasion is attributed to vegetative spread, the best way to prevent establishment is to avoid planting it, especially in areas where periwinkles are known to thrive (Stone, 2009). When selecting plants for a site, do not purchase, trade, or transplant common periwinkle. The Invasive Species Council of BC's 'Grow Me Instead' Program or Metro Vancouver's Grow Green website provide recommendations for non-invasive, drought-tolerant plants, and garden design ideas. All materials (e.g., topsoil, gravel, mulch, compost, wood chips, plant stock) should be weed-free. Common periwinkle can be introduced via these materials and sites where they are used should be monitored carefully for any growth (Crosby, 2018).

Healthy green spaces are more resistant to invasion by invasive plants, so it is also important to maintain or establish healthy plant communities.

MANUAL/MECHANICAL: RECOMMENDED

For the first three manual control methods listed below, experts suggest first using a rake to raise and loosen the stolons (Bean & Russo, 1986) or a hand tiller to loosen roots and soil (Nombrado, 2024). For all the methods listed in this section, applying mulch can slow any regrowth (see Restoration section).

- **Pulling** by hand repeatedly will eventually deplete the plant of resources (Evergreen, 2015; Bean & Russo, 1986). Care must be taken to remove all stems, stolons, and root nodes (DiTomaso & Kyser, 2013). This is the most widely recommended control method for common periwinkle, although it is very time-consuming and may be difficult to achieve for large sites. Common periwinkle is a suitable target plant for community weed pulls using this technique.
- **Digging** may be required for established sites where hand pulling alone will not release the roots (USDA Forest Service, 2006). Digging can also be used to remove entire sections of common periwinkle where the plants have established as dense mats (Yong, 2024). The City of Burnaby has had success using a spade or shovel to cut sections of mats, pull/peel the edges back exposing the roots, and work the roots from the ground to release the entire mat (Yong, 2024). This method can be repeated for large infestations, but regrowth can be expected at the edges (Yong, 2024). This method is time-consuming and causes soil disturbance.

- **Mowing** (or line trimming/weed eating) common periwinkle close to the ground may slow spread but will not eradicate the plant, which requires removal of the stems and roots (Bean & Russo, 1986). Mowing must be undertaken regularly to keep up with regrowth and will not likely eradicate the plants because it does not remove underground plant material.
- **Covering** small infestations for 4-6 months after hand pulling or mowing can help discourage regrowth (Stone, 2009). Tarps, landscape fabric or cardboard can be applied. This method is not successful on its own and may be challenging to implement around existing desired vegetation.

REMOVAL TIMING

Manual/mechanical control methods can be undertaken anytime, but they are often initiated in the spring as soon as new growth appears. Manual/mechanical control methods should be repeated throughout the growing season.

APPLYING MANUAL/MECHANICAL CONTROL METHODS IN RIPARIAN AREAS

Common periwinkle often grows in large contiguous patches right up to the edge of water courses. Consider the impact of control techniques and the resulting bare soil on the adjacent aquatic environment. Schedule removal works during a period of least risk to fish species, outside of the fish window. Adhere to Provincial and Federal riparian regulations. It is recommended to consult with a qualified environmental professional when working around water bodies.

CHEMICAL: CAUTION

When alternative methods to prevent or control invasive plants are unsuccessful, professionals often turn to herbicides. Although some trials have been successful, the thick leaves of Vinca are not ideal for chemical control (Bean & Russo, 1986). This method is best used as a follow-up treatment to manual control (Bean & Russo, 1986), or when manual control methods cannot be used. Damage caused by pulling or mowing may increase the uptake of the herbicide, which is usually prevented by the leaf's thick cuticle (Bean & Russo, 1986).

This method should be used with caution for the following reasons (Crosby, 2018):

1. Weather conditions greatly influence treatment efficacy;
2. Common periwinkle often grows in riparian areas where pesticide use is restricted; and
3. Since common periwinkle growth is often closely associated with other plants, chemical control can easily damage non-target species (Province of BC, 2002).

With the exception of substances listed on Schedule 2 of the BC Integrated Pest Management Regulation, the use of herbicides is highly regulated in British Columbia. Site characteristics must be considered with herbicide prescribed, based on site goals and objectives and in accordance with legal requirements. This summary of BC's *Integrated Pest Management Act* provides an overview of the provincial legislation.

PESTICIDE LICENCE AND CERTIFICATION

A valid pesticide licence is required to:

- offer a service to apply most pesticides;
- apply most pesticides on public land including local government lands[2]; and
- apply pesticides to landscaped areas on private land, including outside office buildings and other facilities.

Pesticides (e.g., herbicides, insecticides, fungicides) are regulated by the Federal and Provincial governments, and municipal governments often have pesticide bylaws.

- Health Canada evaluates and approves chemical pest control products as per the Pest Control Products Act.
- The BC *Integrated Pest Management Act* sets out the requirements for the use and sale of pesticides in British Columbia. This Act is administered by the Ministry of Environment and Climate Change Strategy.
- Several municipalities have adopted bylaws that prohibit the use of certain pesticides.

Everyone who uses pesticides must be familiar with all relevant laws.

ONLY companies or practitioners with a valid Pesticide Licence and staff who are certified applicators (or working under a certified applicator) may apply herbicide on invasive plants located on public lands in British Columbia. Applicators must be either the land manager/owner or have permission from the land manager/owner prior to herbicide application.

On private property the owner may obtain a Residential Applicators Certificate (for Domestic class products only) or use a qualified company. Residents do not require a Residential Applicator Certificate for certain uses of domestic class glyphosate including treatment of plants that are poisonous for people to touch, invasive plants and noxious weeds listed in legislation, and weeds growing through cracks in hard surfaces such as asphalt or concrete. Refer to the 'Pesticides & Pest Management' and 'Home Pesticide Use' webpages listed in the Additional Resources Section for more information.

Questions? Contact the BC Integrated Pest Management Program: Telephone: (250) 387-9537

Email: bc.ipm@gov.bc.ca

2 on up to 50 ha/year by a single organization. Organizations looking to treat over 50 hectares of land per year are also required to submit a Pest Management Plan and obtain a Pesticide Use Notice confirmation..

Pesticide applicator certificates can be obtained under the category 'Industrial Vegetation Management' to manage weeds on industrial land, roads, power lines, railways, and pipeline rights-of-way for control of noxious weeds on private or public land. However, since common periwinkle is not a regulated noxious weed in the Metro Vancouver region, the 'Landscape' certification category is needed for herbicide use on public and private lands. Assistant applicator training is also available and the online course and exam are free.

It is best practice for personnel supervising or monitoring pesticide contracts to also maintain a pesticide applicator licence so they are familiar with certification requirements.

For more information on how to obtain a licence and the requirements when working under the provincial *Integrated Pest Management Act and Regulation*, please review the Noxious Weed & Vegetation Management section on this webpage: gov.bc.ca/PestManagement.

HERBICIDE LABELS

Individual herbicide labels must always be reviewed thoroughly prior to use to ensure precautions, application rates, and all use directions, specific site and application directions are strictly followed. Under the federal *Pest Control Products Act* and the BC *Integrated Pest Management Regulation*, **persons are legally required to use pesticides (including herbicides) only for the use described on the label and in accordance with the instructions on that label**. Failure to follow label directions could cause damage to the environment, create poor control results, or pose a danger to health. Contravention of laws and regulations may lead to cancellation or suspension of a licence or certification, requirement to obtain a qualified monitor to assess work, additional reporting requirements, a stop work order, or prohibition from acquiring authorization in the future. A conviction of an offence under legislation may also carry a fine or imprisonment.

Herbicide labels include information on both the front and back. The front typically includes trade or product name, formulation, class, purpose, registration number, and precautionary symbols. Instructions on how to use the pesticide and what to do in order to protect the health and safety of both the applicator and public are provided on the back (BC Ministry of Environment, 2011).

Labels are also available from the Pest Management Regulatory Agency's online pesticide label search or mobile application as a separate document. These label documents may include booklets or material safety data sheets (MSDS) that provide additional information about a pesticide product. Restrictions on site conditions, soil types, and proximity to water may be listed. If the herbicide label is more restrictive than Provincial legislation, the label must be followed.

HERBICIDE OPTIONS

Although not specifically listed on the labels for the following herbicides, common periwinkle may be treated under the general application provision for perennial broadleaved plants. The following herbicides can be used on common periwinkle. Unless otherwise noted, information is from DiTomaso & Kyser (2013). Herbicides are listed in order of recommendation for use on common periwinkle (glyphosate at the top is most effective).

ACTIVE INGREDIENT (EXAMPLE BRAND NAMES)+	APPLICATION	PERSISTENCE	GROWTH STAGE++	TYPE+++	COMMENT
Glyphosate§ (many products)	foliar application	non-residual*	actively growing	non-selective	Apply late summer to early fall for best results when using this method on its own (O'Driscoll, 2009)
Triclopyr (example: Garlon™)	foliar application	residual	actively growing	selective, no effect on grasses	Apply in spring for best results when using this method on its own; will not impact grasses
Imazapyr (example: Arsenal™)	foliar application	residual	actively growing	non-selective	Apply late summer to early fall for best results when using this method on its own; may leave bare ground around plants after treatment

+ The mention of a specific product or brand name of pesticide in this document is not, and should not be construed as, an endorsement or recommendation for the use of that product.

++ Active growing periods vary from year to year depending on weather and other factors. There may be more than one active growing period for a plant in a year.

+++ Herbicides that control all vegetation are non-selective, while those that control certain types of vegetation (e.g., only grasses or only broadleaf plants) are termed selective.

§ Glyphosate can impact trees with roots within or adjacent to the treatment area.

* Non-residual herbicides are active only on growing plant tissue have little or no persistence in the soil whereas residual herbicides persist in the soil, remaining effective over an extended period.

APPLYING PESTICIDE IN RIPARIAN AREAS

Provincial legislation prohibits the use of herbicides within 10 metres of natural water courses and 30 metres of domestic or agricultural water sources on public lands. On private lands herbicide labels need to be followed (which means for glyphosate products treatment can happen up to the water's edge) and other restrictions may apply (e.g. industrial sites, forestry sites, golf courses, etc.). On public lands, glyphosate is the only active ingredient that can be applied within the 10 metre Pesticide-Free Zone (PFZ)[3] in British Columbia in accordance with the *Integrated Pest Management Act* and Regulation and all public land Pesticide Management Plans (PMPs). A plant must be either a listed Noxious Weed (under the *Weed Control Act*) or appear in the *Forest and Range Practices Act* Invasive Plants Regulation to be treated within the 10 metre PFZ. **Common periwinkle is not listed and therefore glyphosate and other herbicides can only be applied on common periwinkle up to 10 metres away from the high water mark (HWM)[4]**. The 30 metre no-treatment zone around a water supply intake or well used for domestic or agricultural purposes may be reduced if the licencee or PMP holder is "reasonably satisfied" that a smaller no-treatment zone is sufficient to ensure that pesticide from the use will not enter the intake or well.

When managing common periwinkle with herbicide in riparian areas:

- Observe and mark all PFZs while on site.
- The HWM should be determined by careful evaluation by the applicator.
- Distances in PFZs should be measured as horizontal distance.
- Herbicides restricted in a PFZ must not enter these zones by leaching (lateral mobility) through soil or by drift of spray mist or droplets.
- Treatments should be conducted when water levels are low (e.g. summer months) to reduce risk.
- Note that efficacy may be dependent on site conditions, including moisture in the soil.

3 The Pesticide-Free Zone (PFZ) is an area of land that must not be treated with pesticide and must be protected from pesticide moving into it, under the *Integrated Pest Management Act* and Regulation.

4 The High Water Mark (HWM) is defined as the visible high water mark of any lake, stream, wetland or other body of water where the presence and action of the water are so common and usual and so long continued in all ordinary years as to mark upon the soil of the bed of the lake, river stream, or other body of water a character distinct from that of the banks, both in vegetation and in the nature of the soil itself. Typical features may include, a natural line or "mark" impressed on the bank or shore, indicated by erosion, shelving, changes in soil characteristics, destruction of terrestrial vegetation, or other distinctive physical characteristics. The area below the high water mark includes the active floodplain (BC Ministry of Environment, 2011).

APPLICATION METHODS

Foliar application can be undertaken by hand or backpack sprayer. This treatment is best used as a follow-up method within 5-10 minutes after manual/mechanical control (Bean & Russo, 1986). This method can also be used for spot treatment of isolated plants (Stone, 2009). When used on its own, the best timing for herbicide application is herbicide-dependent (see herbicide table above). No matter what herbicide is used, it may take several months for the leaves to show damage (O'Driscoll, 2009).

CULTURAL: NOT AVAILABLE

There are no documented cultural control methods for common periwinkle (Stone, 2009).

- **Grazing** opportunities are limited in urban areas due to municipal bylaws regulating agricultural animals, the high probability of interface with the public, and the damage animals could cause to riparian areas and other sensitive sites with multiple land uses. Common periwinkle is reportedly unpalatable to livestock (Stone, 2009) and not grazed by Canada geese (Conover, 1991). Grazing is not recommended as a management option for this species in Metro Vancouver.

BIOLOGICAL: NOT AVAILABLE

A stem blight fungus (*Phoma exigua var. exigua*) is a natural pest of common periwinkle that causes dieback of new growth in the spring (USDA Forest Service, 2006). Although this is a serious disease of common periwinkle, it is mostly of concern for commercial growers of the plant, and the fungus has not been explored for biocontrol purposes (Stone, 2009). There are no biological control agents currently available in BC for common periwinkle.

Common periwinkle growing underneath a hedge

CREDIT: ISCMV

CONTROL SUMMARY

The following table provides a summary and comparison of control methods for butterfly bush.

CONTROL STRATEGY	TECHNIQUES	APPLICABLE SITE TYPE	PROS	CONS
Manual	**Pulling**	Any site	Most recommended control method for this species, selective, non-chemical, inexpensive	Labour intensive, regrowth may occur for several years, may create soil disturbance, must remove entire plant, must deal with biomass
	Digging	Any site, sites where pulling is not successful, or large matted sites	Selective, non-chemical, inexpensive	
Mechanical	**Mowing**	Any site where mowing equipment is accessible	Non-chemical	Labour intensive, regrowth may occur for several years, may require trained staff and specialty equipment, will not eliminate the plants
Manual	**Covering**	Small infestations, follow-up treatment after manual control	Selective, non-chemical	Challenging to implement around existing vegetation, not successful on its own
Chemical	**Foliar application**	Follow-up to manual control method or spot control of isolated sites	Selective with appropriate herbicide and application, less labour intensive	Unintended environmental/health impacts, high public concern, weather dependent, requires trained staff, most successful when used with other methods
Cultural	**Grazing**	None		Not a suitable management option for this species in Metro Vancouver
Biological	**No biological control agents are currently available for common periwinkle**			

CONTROL SUMMARY COLOUR LEGEND

GREEN: RECOMMENDED

ORANGE: CAUTION

RED: NOT RECOMMENDED OR NOT AVAILABLE

Disposal

ON SITE DISPOSAL

Since common periwinkle spreads by stem, stolon and root fragments, on site disposal is not recommended.

OFF SITE DISPOSAL

In the Metro Vancouver region, several facilities accept common periwinkle plants and/or infested soil. Please consult this disposal facility list for current details.

PLEASE CONTACT ALL FACILITIES BEFOREHAND TO CONFIRM THEY CAN PROPERLY HANDLE THE MATERIAL.

CLEANING AND DISINFECTION[5]

Before leaving a site, all visible plant parts and soil from vehicles, equipment, and gear should be removed and rinsed if possible. When back at a works yard or wash station, vehicles should be cleaned and disinfected using the following steps:

- Wash with 180 °F water at 6 gpm, 2000 psi*, with a contact time of ≥ 10 seconds on all surfaces to remove dirt and organic matter such as vegetation parts or seeds. Pay special attention to undercarriages, chassis, wheel-wells, radiators, grills, tracks, buckets, chip-boxes, blades, and flail-mowing chains.
- Use compressed air to remove vegetation from grills and radiators.
- Sweep/vacuum interior of vehicles paying special attention to floor mats, pedals, and seats.
- Steam clean poor access areas (e.g., inside trailer tubes) – 200 psi @ 300 °F (149°C).
- Fully rinse detergent residue from equipment prior to leaving the facility

* Appropriate self-serve and mobile hot power-wash companies in the Metro Vancouver area include: Omega Power Washing, Eco Klean Truck Wash, RG Truck Wash, Ravens Mobile Pressure Washing, Hydrotech Powerwashing, Platinum Pressure Washing Inc, and Alblaster Pressure Washing. Wash stations should be monitored regularly for common periwinkle growth.

Follow-up Monitoring

Whatever control method is used, follow-up monitoring and maintenance treatments are components of an integrated management plan or approach. Manually/mechanically controlled sites may take repeated efforts over several years (DiTomaso & Kyser, 2013). During the growing season following first treatments, the common periwinkle plants may be sparser and more difficult to find amongst other plants and leaf litter (Stone, 2009). Sites should be monitored closely for several years after treatment.

5 Adapted from Metro Vancouver 2017 Water Services Equipment Cleaning Procedures and Inspection Protocols.

Restoration

Heavily mulching after manual/mechanical removal can decrease the likelihood of regrowth (Evergreen, 2015).

Examples of common competitive native species prescribed in Metro Vancouver sites are summarized in the table below based on site moisture.

WET SITES	MOIST SITES	DRY SITES
SHRUBS		
Salmonberry	Salmonberry	Thimbleberry
Hardhack	Willow	Nootka rose
Willow	Red osier dogwood	Red flowering currant
Red osier dogwood	Red elderberry	Snowberry
Pacific ninebark	Vine maple	Tall Oregon grape
	Indian plum	Oceanspray
TREES		
Western red cedar	Western red cedar	Douglas-fir
Red alder	Red alder	Red alder

Replacement species should be chosen based on the ecology of the site by a qualified environmental professional. Local biologists, environmental professionals, agronomists, agrologists, native and domestic forage specialists, seed companies, and plant nurseries are all good sources for localized recommendations for regional native species and regionally adapted domestic species, based on site usage. Native grass seed mixes are also available. There are several science-based resources available to guide restoration efforts, such as the South Coast Conservation Program's Diversity by Design restoration planning toolkit.

Revegetation of the site to a domestic or cultured non-native plant species composition may be considered in some circumstances. Often domestic species establish faster and grow more prolifically, which aids in resisting common periwinkle re-invasion. There are many native and non-invasive groundcovers that offer similar characteristics as common periwinkle, including: dull Oregon grape (*Mahonia nervosa*), sweet violet (*Viola odorata*), redwood sorrel (*Oxalis oregana*), coral bells (*Heuchera micrantha*), bunchberry (*Cornus canadensis*), false lily of the valley (*Maianthemum dilatum*), kinnickinnick (*Arctostaphylos uva-ursi*), lowfast cotoneaster (*Cotoneaster dammeri* 'Lowfast'), wild ginger (*Asarum canadense*), foamflower (*Tiarella trifoliata*), and native ferns.

Common periwinkle sites are often found in areas with existing, or potential, wildlife populations (e.g., deer, beaver, muskrat, vole, etc.) that can damage restoration plantings. Therefore, any revegetation plan must consider impacts from wildlife and utilize appropriate mitigation measures to protect the restoration and existing native plantings (e.g., tree wrapping, exclusion caging/fencing, vole guards, etc.).

References

BC Ministry of Environment. (2011). *Canadian Pesticide Education Program: Applicator Core Manual. Federal, Provincial, Territorial Working Group on Pesticide Education, Training and Certification.*

Bean, C., & Russo, M. J. (1986). *Element Stewardship Abstract for Vinca major. Arlington: The Nature Conservancy*.

Bultman, T. L., & DeWitt, D. J. (2008). Effect of an invasive ground cover plant on the abundance and diversity of a forest floor spider assemblage. *Biological Invasions*, 749-756.

Canadian Wildlife Federation. (2024). *Virginia Creeper*. Retrieved from Flora: https://cwf-fcf.org/en/resources/encyclopedias/flora/virginia-creeper.html

Conover, M. R. (1991). Herbivory by Canada Geese: Diet Selection and Effect on Lawns. *Ecological Applications*, 231-236.

Conservation Halton. (2022). *FactSheet Invasive Species: Periwinkle (Vinca major and Vinca minor)*.

Crosby, K. (2018, December). Natural Areas Coordinator, City of Surrey. (F. Steele, Interviewer)

Cushman, J. H., & Gaffney, K. A. (2010). Community-level consequences of invasion: impacts of exotic clonal plants on riparian vegetation. *Biological Invasions*, 2765-2776.

Darcy, A. J., & Burkart, M. C. (2002). Allelopathic potential of Vinca minor, an invasive exotic plant in west Michigan forests. *Bios*, 127-132.

Dhyani, P., Quispe, C., Sharma, E., Bahukhandi, A., Sati, P., Attri, D. C., Szopa, A., Sharifi-Rad, J., Docea, A. O., Mardare, I., Calina, D., Cho, W. C. (2022). Anticancer potential of alkaloids: a key emphasis to colchicine, vinblastine, vincristine, vindesine, vinorelbine and vincamine. *Cancer Cell International*.

DiTomaso, J., & Kyser, G. (2013). Vinca major L. Big periwinkle. In Weed *Control in Natural Areas in the Western United States*. Weed Research and Information Center, University of California.

Evergreen. (2015). *Invasive Plant Profile Common Periwinkle, Vinca, Vinca Minor, Family: Apocynaceae Zone* 4-8. Vancouver.

Gasior, I. (2024). Research Assistant, City of Burnaby. (T. Murray, Interviewer)

Huner, N., Krol, M., Williams, J., & Maissan, E. (1988). Overwintering Periwinkle (Vinca minor L.) Exhibits Increased Photosystem I Activity. Plant Physiology, 721-726.

Invasive Species Council of BC. (2017). *Common Periwinkle Factsheet*. Retrieved from https://bcinvasives.ca/wp-content/uploads/2021/01/Periwinkle.pdf

Invasive Species Council of BC. (2021). *Grow Me Instead*. Retrieved from https://bcinvasives.ca/wp-content/uploads/2021/01/ISCBC-GMI-Brochure-180425-WEB-1.pdf

Invasive Species Council of BC. (2023). *Common periwinkle Vinca minor*. Retrieved from Invasive Plant: https://bcinvasives.ca/invasives/common-periwinkle/

Khanavi, M., Pourmoslemi, S., Farahanikia, B., Hadjiakhoondi, A., & Ostad, S. N. (2010). Cytotoxicity of Vinca minor. *Pharmaceutical Biology*, 96-100.

Klinkenberg, B. (2024). Retrieved from E-Flora BC: Electronic Atlas of the Plants of British Columbia [eflora.bc.ca]: https://linnet.geog.ubc.ca/biodiversity/eflora/index.html

Landon, A. L., & Banko, T. J. (2005). Propagation of Vinca minor by Single-node Cuttings. *Journal of Environmental Horticulture*, 1-3.

Metro Vancouver. (2016). Climate Projections for Metro Vancouver. Burnaby, BC.

Nombrado, G. (2024). Executive Director, Free the Fern. (T. Murray, Interviewer)

O'Driscoll, M. G. (2009). *Exotic Plant Management at the Guilford Courthouse National Military Park, Greensboro, North Carolina, with Observations on the Spread and Control of Common Periwinkle (Vinca minor) [graduate thesis].* Raleigh, North Carolina: North Carolina State University.

Okanagan Xeriscape Association. (2024). *Winter creeper.* Retrieved from Plant Search Database: https://okanaganxeriscape.org/db/plant/380

Province of BC. (2002). *A Guide to Weeds in British Columbia.*

Stone, K. R. (2009). *Vinca major, V. minor*. Retrieved from Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory: https://www.fs.usda.gov/database/feis/plants/vine/vinspp/all.html

Toronto Master Gardeners. (2021). *Invasive Plants Fact Sheets: Periwinkle.* Invasive Species Centre.

USDA Forest Service. (2006). *Common Periwinkle*. Retrieved from Weed of the Week: https://www.invasive.org/weedcd/pdfs/wow/common-periwinkle.pdf

USDA Natural Resources Conservation Service. (2002). Plant *Fact Sheet: Common Periwinkle.*

Yong, M. (2024). Environmental Planner, City of Burnaby. (T. Murray, Interviewer)

Additional Resources

For more information please refer to the following resources.

- BC Ministry of Forests, Lands, and Natural Resource Operations, Invasive Alien Plant Program (IAPP). www.gov.bc.ca/invasive-species
- Grow Green Guide. www.growgreenguide.ca
- Grow Me Instead. http://bcinvasives.ca/resources/programs/plant-wise/
- Invasive Species Council of BC. (2017). Common Periwinkle Factsheet. https://bcinvasives.ca/wp-content/uploads/2021/01/Periwinkle.pdf
- Pesticides and Pest Management. Province of British Columbia https://www2.gov.bc.ca/gov/content/environment/pesticides-pest-management
- Sea to Sky Invasive Species Council (2021). Small Periwinkle Factsheet. https://ssisc.ca/wp-content/uploads/2021/09/Small-Periwinkle-Vinca-minor-Factsheet-2021.pdf

Acknowledgments

The project team would like to thank the following group for its contributions related to the development and review of this document:

The Regional Invasive Species Working Group

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Common periwinkle growing along a driveway

CREDIT: ISCMV


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