

Bittersweet Nightshade

Solanum dulcamara
Solanaceae

King County Weed of Concern
Control Recommended

Legal Status in King County: Bittersweet nightshade is not on the Washington Noxious Weed List and there is no legal requirement to control it. The King County Noxious Weed Control Board recognizes that this plant is invasive and is collecting information and providing education on control. The Board encourages and recommends control and containment of existing populations and discourages new plantings.

BACKGROUND INFORMATION

Impacts and History

- Eurasian vine naturalized throughout North America along waterways, lakeshores and open areas.
- Toxic to people, pets and livestock. Consumption has caused livestock loss and fatal poisoning of children although toxin amount is variable in plants and may not always cause symptoms.
- Widespread weed along creeks, wetlands, backyards, and edges of fields and forests, usually mixed with other weedy species and at times forming dense thickets.
- Can become the dominant weed along small creeks causing channel disruption and crowding out native species such as salmonberry, redbud dogwood, willows, hazelnut, and alders.

Description

- Perennial vine or scrambling semi-woody shrub.
- Star-shaped purple flowers have 5 backward-pointing petals and stamens fused in a prominent yellow cone.



Bittersweet nightshade with berries
Cornell University



Bittersweet nightshade flowers closeup
Katholieke University Leuven

- Flowers grow in clusters along branches on short stalks extending out from the stems.
- Berries are round or egg-shaped and bright red when ripe with numerous yellow, flattened seeds; unripe berries are green and then orange.
- All stages of berries can be found on the same plants along with flowers.
- Leaves are dark-green to purplish and often with one or two small ear-like lobes near the base.
- Leaf blades are 1 to 4 inches long and leaf stalks (petioles) are 1/2 inch to 1 1/2 inches long.
- Base of plant is woody and the upper herbaceous branches die back each year.
- Crushed leaves and bark have an unpleasant smell.
- Slender branches are light green, becoming gray-brown and then furrowed on the lower stem, rarely more than 1/2 inch thick.
- Wood is creamy-white and brittle.
- The main root grows horizontally just below the surface and suckers frequently.
- Climbs onto small trees, shrubs and fences or remains low-growing depending on what is available; can climb 30 feet or higher into trees or form thickets along the ground.
- Plants grow singly or in dense patches.

Toxicity

- Entire plant contains solanine, the same toxin found in green potatoes and other members of the nightshade family.
- Also contains a glycoside called dulcamarine, similar in structure and effects to atropine, one of the toxins found in deadly nightshade or belladonna.
- Ripe fruits are less toxic than the leaves and unripe berries but even ripe berries can be poisonous.
- Toxin amount varies with soil, light, climate and growth stage.
- Symptoms of poisoning include: abdominal pain, headache, tiredness, flushing and irritation of the skin and mucous membranes.
- Severe cases can result in vomiting, thirst, difficult breathing, restlessness, subnormal temperature, paralysis, dilated pupils, diarrhea, blood in urine, shock, extreme weakness, loss of sensation, and occasionally death.

Habitat

- Typically grows in wet sites or near water but tolerates a wide range of conditions from relatively dry to wet and from full sun to medium shade.
- Plants flower and produce berries more in full sun to light shade.
- Found in disturbed sites as well as relatively undisturbed wetlands and creek areas.
- Can become dominant on the banks and in the channel of small creeks and competes with native shrubs such as willows that would otherwise be dominant along these creeks.
- Often found rooted in moist soil but growing up and over other vegetation to reach more light and take advantage of the structural support provided by shrubs and trees growing along creeks and wetlands or of fences and thickets found along edges of fields and backyards.

Reproduction and Spread

- Flowers mid-May to September.
- Fruit and seed production can be abundant and each berry contains about 30 seeds.
- Spreads to new locations by birds eating the ripe berries and by fragments of stem and root moving in soil or water.
- Moves out from a parent plant by way of suckering roots, prostrate stems rooting at nodes, and by growing up and over vegetation or structures like fences and buildings.
- Branches grow and die back 3 to 6 feet or more each year.

Local Distribution

Found throughout King County, especially near wetlands and creeks but also in many backyards, fields, parks and roadsides.

CONTROL INFORMATION

Integrated Pest Management

- The preferred approach for weed control is Integrated Pest Management (IPM). IPM involves selecting from a range of possible control methods to match the management requirements of each specific site. The goal is to maximize effective control and to minimize negative environmental, economic and social impacts.
- Use a multifaceted and adaptive approach. Select control methods which reflect the available time, funding, and labor of the participants, the land use goals, and the values of the community and landowners. Management will require dedication over a number of years, and should allow for flexibility in method as appropriate.

Planning Considerations

- Plan your control effort including: 1) surveying the area thoroughly for bittersweet nightshade, 2) setting priorities for control, 3) selecting the best control method(s) for the site conditions and regulatory compliance issues, and 4) monitoring the success of control and implementing follow up control as necessary.
- In unincorporated King County outside of critical aquifer recharge areas, wetlands, aquatic areas, wildlife network areas and their buffers, a Clearing and Grading permit is not required to clear areas of bittersweet nightshade if: 1) the annual area to be cleared is less than 7000 square feet or 2) if the clearing is conducted in accordance with an approved Forest Management Plan, Farm Management Plan or Rural Stewardship Plan. Within critical aquifer recharge areas, wetlands, aquatic areas, wildlife network areas and their buffers, Clearing and Grading permits are not required if the area to be cleared is less than 7000 square feet and is removed by hand labor clearing or is conducted in accordance with one of the stewardship plans mentioned above. Clearing in excess of these limits will require a permit.

- In incorporated areas, check with your local land use agency about any required permits or restrictions on clearing invasive vegetation.
- Control practices in critical areas should be selected to minimize soil disturbance or efforts should be taken to mitigate or reduce impacts of disturbance. Any disturbed areas need to be stabilized to control erosion and sediment deposition. Refer to the King County Surface Design Manual for further information about sediment and erosion control practices (www.kingcounty.gov/environment/waterandland/stormwater/documents/surface-water-design-manual). Minimizing disturbance also avoids creating more opportunities for germination of seeds of bittersweet nightshade and other weeds.
- Generally work first in least infested areas, moving towards more heavily infested areas.
- Ensure habitat protection by targeting only bittersweet nightshade and other invasive vegetation and preserving all native and beneficial vegetation.

Early Detection and Prevention

- Bittersweet nightshade is easiest to spot from mid-May to late fall. Look for purple flowers from May to September and berries from August through early winter.
- Manually control new infestations as early as possible making sure to remove all roots.
- Monitor the control site and remove any plants returning from root fragments.

Manual

- Hand-pull the stem closest to the ground and pull or dig up the roots, taking care not to break the slender roots. This method is most effective with young plants and new infestations.
- Manual control works best after rain or in loose soils and is generally effective on small infestations. Tools that work include shovels, spades, claw mattocks, hand-cultivators to loosen soil, and hand-pulling (wear gloves when handling bittersweet nightshade).
- Digging may not be effective where the roots are growing down between rocks or mixed in with desirable plants where it is not possible to remove enough of the roots to prevent re-growth. In those situations, another method will need to be used: repeated cutting to starve the roots, cutting and covering with weed barrier cloth, or spot-spraying the plants with an appropriate herbicide (see section below on chemical control).
- Recheck work area because even small root or stem fragments left behind can re-sprout.
- If removing dense patches, area should be replanted with native or non-invasive plants and mulched around new plantings to minimize re-invasion by nightshade and other weeds.
- Hand-pulling and clearing with the use of hand mechanical tools of up to seven thousand square feet annually is allowable without a permit in unincorporated King County, including all critical areas and buffers. Removing over that amount may require a permit in un-incorporated King County. For incorporated areas, check with your local land use agency for any limits or permits needed.
- Manual control can cause considerable sediment disturbance in and near creek beds, so measures should be taken to minimize impacts during work, and all applicable “fish windows” should be followed to avoid damaging fish habitat during spawning seasons.

Mechanical

- Mowing is not usually practical on bittersweet nightshade because of its growth form and habitat, although brush cutting may facilitate access to roots for manual removal if the plants are growing in dense thickets.
- Brush-cutting mowers should not be used where soils are highly susceptible to compaction or erosion, or where soils are very wet.
- Cutting to the ground can be combined with covering with heavy duty geotextile fabric (woven plastic fabric) or other sheet mulching materials. Covering needs to be kept securely in place for at least two years and should be checked several times a year for any emerging stems around edges or through gaps. Cut any escaping plants to the ground and cover area.

Biological

- Biological control is the deliberate introduction of insects, mammals or other organisms which adversely affect the target weed species. Biological control is generally most effective when used in conjunction with other control techniques. There are currently no biological control agents available for bittersweet nightshade.

Chemical

- **Precautions:**
 - Herbicides should only be applied at the rates and for the site conditions and/or land usage specified on the label. **Follow all label directions.**
 - Herbicide specified in these guidelines may be used in critical areas and their buffers with certain restrictions if the use is in accordance with Federal and State Laws. Refer to the **King County Noxious Weed Regulatory Guidelines** for a summary of current Federal, State and local restrictions and regulatory compliance issues.
 - For your personal safety, at a minimum wear gloves, long sleeves, long pants, closed toe shoes, and appropriate eye protection. Follow label directions for any additional personal protection equipment needed.
- For control of large infestations, herbicide use may be effective, either alone or in combination with manual removal. Nightshade plants should not be cut back until after the herbicide has had a chance to work and the weeds are brown and dead.
- Herbicide treatment is generally most effective when temperatures are between 50 and 85 degrees Fahrenheit for several days and rain is not expected for 24 hours.
- In areas where spring wildflowers or other native plants are interspersed, herbicide application should be done before they emerge or after they have gone dormant.
- For all herbicides, re-treatment in the following one to two years or more may be necessary to control any returning or skipped plants. Continue to monitor for new plants for at least three years after the initial treatment and following any disturbance to the soil such as floods, tilling or construction.

- It is important to establish new vegetation after treating an area. Follow the label for the timing because some herbicides stay active longer than others. Along streams and wetlands, plant suitable native trees and shrubs such as cottonwood, alders and willows.

Specific Herbicide Information

The active ingredients described below are available in many different commercial formulations and brand names. In some cases they are ready to use, and in others mixing with water is required. Sometimes herbicides are sold with surfactants mixed in to improve the uptake of the herbicide by the plant. In other cases, the user may need to add a suitable surfactant to improve the control results. References to product names are for example only, and other equally, or more effective commercial products may be available.

Glyphosate: This chemical has been reported to control bittersweet nightshade. It is available in both aquatic and terrestrial formulations. Treatment with glyphosate needs to be combined with effective re-vegetation of the site to prevent re-invasion by undesirable vegetation and to control erosion. Glyphosate is most effective on plants such as bittersweet nightshade from August to October when canes are actively growing and after berries have formed. Fall treatments should be conducted before the first hard frost and when temperatures are 50 degrees F or higher. Glyphosate may also be effective during early summer after the plants have fully leafed out but before flowering. Herbicide should be applied to the leaves by spraying or wiping on. Glyphosate may also be effective as a cut-stem treatment to freshly cut stems – make sure to wipe on herbicide as soon as stems are cut. The cut-stem method may only be practical on small populations since every stem will need to be treated due to nightshade’s multiple crowns. Apply herbicide to the freshly cut surface according to label directions. Re-planting after treating with glyphosate can be done two weeks after treatment.

Imazapyr: This product is also effective on nightshade and is available in both aquatic and terrestrial formulations. Like glyphosate, it is non-selective and will damage grasses as well as broadleaf plants that it comes into contact with. Also, imazapyr is taken up by both roots and leaves, so avoid treating the drip zone around trees and wherever desirable plants are growing. Apply imazapyr when plants are actively growing. During early to mid-summer or in the fall before the first hard frost would probably be the most effective times. Use a surfactant appropriate for the site (aquatic or terrestrial) and apply by spot spraying on the nightshade. Wait a few months before planting into the treated area (for example, spring planting following fall application).

Triclopyr: Also likely to be effective on nightshade and is generally selective for broadleaf plants so it won’t harm most grasses, sedges, rushes, cattails, lilies and irises. If nightshade is growing with grasses and other monocots, use of triclopyr or another selective herbicide will increase the survival of existing vegetation which will help suppress re-colonization by nightshade and other weeds. Triclopyr is available in both aquatic and terrestrial formulations and is sold as an amine (e.g. Garlon 3A) or ester/BEE (Garlon 4). Like imazapyr, triclopyr is taken up by woody stems and roots as well as leaves so care must be

taken not to spray bark and roots of desirable plants and trees. Triclopyr should be applied when plants are actively growing. Apply by spot-spraying foliage and stems of nightshade. Triclopyr may also be effective as a cut-stem treatment by applying triclopyr to freshly cut stems, but this method will be labor-intensive due to nightshade's multiple crowns. Apply herbicide to the freshly cut surface according to label directions. **NOTE: Certain additional restrictions apply for products containing Triclopyr BEE (e. g. Garlon 4, Crossbow). Refer to the King County Noxious Weed Regulatory Guidelines for more details.**

The mention of a specific product brand name in this document is not, and should not be construed as an endorsement or as a recommendation for the use of that product. Chemical control options may differ for private, commercial and government agency users. **For questions about herbicide use, contact the King County Noxious Weed Control Program at 206-477-9333.**

SUMMARY OF BEST MANAGEMENT PRACTICES

Small Infestations in Native and/or Desirable Vegetation

- Properly identify targeted bittersweet nightshade.
- Mark all desirable vegetation around control area, ensuring that no native plants are removed.
- Small infestations of less than 200 square feet can be effectively and relatively easily hand-pulled or dug up in most cases. Isolated plants should be removed in order to prevent them from infesting a larger area.
- Dig up plants, removing as much root as possible. It may be necessary to use loppers to cut back dense growth in order to access roots.
- Pull or dig up the plants when the soil is moist if possible.
- Replace any divots created when removing the plants to lessen the amount of disturbed soil.
- If digging is not possible due to site conditions or available labor, apply an appropriate herbicide by wiping on leaves and stems, by spot spraying plants or by applying concentrate to cut stems to minimize off-target damage.
- Monitor site throughout growing season and remove any new plants.
- If using an herbicide in an area with grasses, sedges, rushes or cattails, use a selective herbicide to minimize damage to existing vegetation or re-plant as soon as possible after treatment.

Large Infestations/Monocultures

- Properly identify bittersweet nightshade.
- Mark all native vegetation in and around the treatment area, ensuring that no native plants are removed.
- Cut down the bittersweet nightshade with loppers, brush mowers or machetes.
- Following cutting, either dig up the roots if labor is available, treat re-sprouting nightshade growth with an appropriate herbicide (See the Chemical section of this BMP)

or cover the area with a heavy duty woven geotextile fabric or another type of sheet mulch material.

- If the covering or sheet-mulching method is used, check the area several times a year and cut back or spot-spray any stems emerging around edges or between gaps. If re-growth pushes up the covering (allowing light to enter the area), lift up the covering, cut stems back again, and re-cover. Sheet mulch should be kept in place for at least two years or until there is no new growth under the covering. Do not cover the sheet mulch with bark or wood chips because weeds will grow in the bark, it will be difficult to see nightshade growing up through gaps, and it will be more difficult to remove the fabric when the nightshade is gone if it is covered with bark or chips.
- For large areas, it may be more cost-effective to apply herbicide to the mature nightshade plants and then cut back the dead stems before re-planting.
- When large dense areas of nightshade are removed, the bare areas created need to be stabilized and re-vegetated with native or non-invasive vegetation to prevent erosion and re-invasion of nightshade and other invasive weeds refer to the King County Surface Water Design Manual. Ensure that a high standard of nightshade control has been achieved prior to re-vegetating the site.
- If a non-selective herbicide is used in grassy areas, the area needs to be re-seeded to prevent reinvasion by weeds.
- Infested areas will require follow-up management lasting for several years to control plants re-growing from the seed bank and any remaining roots.

Control in Riparian and Aquatic Areas

- Additional permits may be required for control of infestations in riparian areas. See the Noxious Weed Regulatory Guidelines for more information or contact your local jurisdiction.
- In some cases, the cleared area will need to be replanted with native or non-invasive vegetation and stabilized against erosion. See the King County Surface Water Design Manual for further information about sediment and erosion control practices.
- Focus on manual removal for small infestations if possible. Follow procedures listed above.
- When manual removal is used along creeks and ditches, take care to prevent or mitigate for erosion and turbidity problems.
- For larger areas where herbicide use is warranted, apply with a wick wiper, spot spray using low pressure and large droplet size, or use the cut stem method. If herbicide could potentially drift into the water or a wetland area, use only approved aquatic herbicides and surfactants after obtaining necessary permits.

Control in Road Rights-of-Way

- Manually remove infestations if possible.
- If plants are in grassy areas, use a selective broadleaf herbicide; if controlled with a non-selective herbicide, re-seed after control is completed.
- Spot spray nightshade with glyphosate in areas with no desirable grasses.

Disposal Methods

- Plant crowns and rootballs should be collected and discarded with the trash or taken to a transfer station for disposal. Composting rootballs is not recommended.
- Stems can be composted, but they will root on moist soil so they need to be completely dried out before composting.
- Stems can be left on site to dry out and decompose if they are in a dry area where they will not move into waterways or onto moist soil. The area should be monitored for re-growth and stems should not be moved to an un-infested area.
- Dried out stems may be composted on site, disposed of in a city-provided yard waste container or in the green recycling at a transfer station.
- Stems with berries should be collected and put in the trash or taken to a transfer station. If removal is not feasible, these stems can be left on site. However, there is a risk of spread from the seeds, so the area should be monitored for several years for seedlings. Stems should be left well away from waterways, shorelines, roads and un-infested areas.
- Never dispose of plants or plant parts into waterways, wetlands, or other wet sites where they might take root.
- Never dump yard waste in parks or natural areas, as weeds may spread from yard waste piles.

References

Francis, John K., 2003. "*Solanum dulcamara* L., bittersweet nightshade" US Department of Agriculture Forest Service, International Institute of Tropical Forestry.

Jacobson, Arthur Lee. 2001. **Wild plants of greater Seattle**. Published by Arthur Lee Jacobson, Seattle, Washington, pp. 266-267.

Miller, Tim. October 2, 2006. Personal communication.

Pojar, Jim and Andy MacKinnon, eds. 1994. **Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia & Alaska**. Lone Pine Publishing, Vancouver, B.C. Canada, p. 325.

Taylor, Ronald J. 1990. **Northwest weeds: the ugly and beautiful villains of fields, gardens, and roadsides**. Mountain Press Publishing Company, Missoula, Montana, p. 100.

Turner, Nancy J. and Adam F. Szczawinski. 1991. **Common Poisonous Plants and Mushrooms or North America**. Timber Press, Inc. Portland, Oregon, pp. 94-95.

Whitson, Tom D., ed. 2000. **Weeds of the West**. Western Society of Weed Science. Jackson, Wyoming.