Reed Canarygrass

Phalaris arundinacea **Class C Noxious Weed**
Poaceae **Control Recommended**

Legal Status in King County: Reed canarygrass (RCG) is a Class C noxious weed (non-native species that can be designated for control based on local priorities) according to Washington State Noxious Weed Law, RCW 17.10. The State Weed Board has not designated this species for control in King County. The King County Weed Control Board recommends control of this species where feasible, but does not require it.

BACKGROUND INFORMATION

History and Impacts

- Native to Eurasia and possibly North America as well. No reliable way to tell the difference between native and introduced populations. Present on every continent except Antarctica.
- Widespread throughout most of North America including Washington State
- European cultivars widely introduced as hay and forage
- Agricultural use in the Pacific Northwest began at the turn of the 20th century as the first crop following logging for areas being converted to farming
- Used for soil stabilization, although waterways can undermine sod and increase erosion
- Can cause indigestion in livestock
- Forms monospecific stands over time and drastically reduces wetland species diversity
- Can form physical barriers to salmonid migration
- Flooded RCG fields have been known to confuse and strand migrating salmon
- Provides little food for native wildlife species
- Contributes to increased water temperatures
- Dense colonies decrease water flow, increase siltation, contribute to flooding
- Pollen and chaff can aggravate allergies in humans

Reed canarygrass leaf and ligule (*left*); reed canarygrass inflorescence w/seeds formed (*right*)

Description

- Cool-season sod-forming perennial grass 3-9 feet (1-3m) tall
- Rhizomes and dead stems can form sod over 1.5 feet (0.5m) thick that few other species can penetrate
- Stems hairless, hollow, to ½ inch (1.25 cm) in diameter, often reddish near top
- Leaves stick out at a 45 degree angle from the stem
- Leaf blades flat, hairless, ¼ to ¾ inch (0.6-1.9cm) wide, up to 1.5 feet (0.5m) long
- Ligule long and membranous
- Inflorescence is a compact panicle on tall stems high above leaves
- Flowers May to July
- Inflorescence turns from green to purplish in full bloom, then straw colored when seeds form
- Seeds are shiny brown
- Dead stems remain erect and persist throughout the winter, making identification in winter possible

Habitat

- Grows best in wet to damp soil
- Can tolerate prolonged drought in seasonally wet areas
- Can survive in deeper water if recently inundated
- Wet meadows, streambanks, lake margins, ditches, shallow wetlands
- Full sun, does not tolerate shade well

Reproduction and Spread

- Spreads by seed, rhizomes and vegetative fragments
- All plant parts float, facilitating spread in standing or moving water

- Rhizomes:
  - More common form of spread is by rhizomes
  - Rhizomes can extend over 10 feet per year and form a thick mat
- Seeding:
  - Each inflorescence can produce up to 600 seeds;
  - Seeds will not germinate in dense shade
  - Seed germination generally low, seeds viable for less than four years
  - Cold temperatures required for flowering and seed germination
  - Seeds spread on animals, humans (boots, clothing, tools) and cars/machinery
- Vegetative fragments:
  - Detached stems or rhizomes grow into new plants when in contact with bare soil
- Can become established in a disturbed wetland in less than 12 years

Reed canarygrass seeds on muddy boots

Local Distribution

Very widespread in King County in all available habitats

CONTROL INFORMATION

Many of the control techniques discussed below require permits to implement. Refer to the **King County Noxious Weed Control Regulatory Guidelines** for more information on permitting. This document outlines permits and regulations that pertain to physical, cultural, and chemical control methods. The document is available at: www.kingcounty.gov/weeds

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.
- In most cases, a successful reed canarygrass control project will involve at least two different control methods

Early Detection and Prevention

- Reed canarygrass is identifiable year round. Search for it in winter when other grasses are dormant and RCG's persistent, straw-colored stalks are easily seen.
- RCG can be slow to invade intact wetland systems with healthy native plant communities. Any RCG plants found in this situation should be pulled or otherwise carefully controlled as soon as possible.
- Prevent plants from spreading away from existing populations by washing vehicles, boots and animals that have been in infested areas.
- Invasion of any disturbed wetland, including wetland restoration sites, is common since RCG is so widespread. Take measures to prevent establishment such as heavily mulching around new plantings and following a regular maintenance regime to remove new introductions.

Manual Control: using hand tools

- Hand pulling and the use of hand tools are allowable in unincorporated King County critical areas. Check with the local jurisdiction for regulations in other locations.
- Pulling is usually not a viable option because rhizomes will remain in the soil and resprout. It is possible to pull seedlings in wet/mucky soil.
- Dig with hand tools only small clumps in soft soil where you have a reasonable chance of removing all roots and rhizomes.
- Cut small patches with hand clippers or machetes as close to the ground as possible to prevent seeding or as part of an integrated approach. Cutting alone will not kill the plants.
- Clean tools after use to minimize risk of spread.
- Always dispose of removed material properly (see below).

Mechanical Control: using mechanical tools

- Mow or cut using an appropriate tool for the infestation location and size (mowers, brush cutters, line trimmers, tractor-drawn mowers, etc). Follow recommendations below under "Large Infestations/Monocultures" for frequency and timing of mowing.
- Cultivate using discing or tilling machinery as part of an IPM program. Cultivating alone will increase RCG by cutting up and spreading rhizomes unless done frequently through several seasons.
- Burn using a hand-held weed torch. Several varieties are available online. Follow all instructions and safety considerations for the model you use. Do not use a torch in dry or windy conditions. For best results heat small or cut plants slowly to kill all growth.
- Prescribed burning can stimulate growth if done at the wrong time. In the Pacific Northwest that means that burning alone is impractical since fall burns are usually the only timing possible, and fall is the wrong time of year to burn RCG. However, burning can be used as a pre-treatment with other methods such as tilling, shade cloth installation or herbicide application, since it will remove above-ground dead litter.

Burning may require special permits. Check with your local jurisdiction prior to attempting a prescribed burn. For unincorporated King County check with the Department of Permitting and Environmental Review (http://www.kingcounty.gov/property/FireMarshal/BurnBanInfo.aspx)

- Excavating (as with a backhoe) is generally not advised. If a wetland restoration design calls for excavating in reed canarygrass-dominated areas, dispose of all removed plant material properly (see below) and/or bury sod and soil under at least two feet of uncontaminated soil.
- Clean tools and machinery after use to minimize risk of spread.
- Always dispose of removed material properly (see below).

Cultural Control

1) Covering

a) Cover with commercially available shade cloth and secure tightly with stakes, rebar, large garden staples or other appropriate devices. Overlap sections of cloth by at least one foot, and extend the coverage at least two feet beyond the edge of the infestation. Monitor edges and seams for shoots from lateral growth of rhizomes. Shade cloth should be left in place for at least two growing seasons. Shade cloth does not biodegrade and must be removed after use.

b) Sheet mulch using several layers of thick, clean cardboard (no tape or staples). Overlap pieces by at least one foot and extend coverage at least two feet beyond edge of infestation. Cover cardboard with at least four inches of wood mulch or hog fuel.

c) Sheet mulching as described above plus planting densely (2-3 ft. (0.6-0.9 m) apart) with live willow stakes has proven successful in the Puget Sound area, but will not work in areas that get flooded.

2) Flooding

a) If it is possible to manipulate water levels, flood to at least 18 inches (if combined with intensive cultivation) or at least 32 inches if flooding is the only control method.

3) Planting shade

a) Establish desirable trees and shrubs to form shade canopy. Where possible, plan to establish a multi-layered dense canopy, preferably with conifers in the overstory. Dense planting of alders or cottonwoods has also been shown to reduce RCG once a canopy is formed.

b) Install live willow stakes planted at a density of 2-3 ft. (0.6-0.9 m) apart.

c) Any planting effort must include monitoring and spot control of reinvasion for several seasons until trees and shrubs are large enough to compete with RCG. Heavy mulching when plants are small will help.

d) Incomplete shade will allow RCG to recover and/or re-invade.

Chemical Control

Precautions

1) Herbicides should only be applied at the rates and for the site conditions and/or land usage specified on the label of the product being used. **Follow all label directions**.
2) 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.
3) Permits and licenses are required for all chemical control in water and where herbicide is likely to drift into water.
4) Herbicides can only be applied to aquatic systems in Washington State by a licensed pesticide applicator with an aquatic endorsement on their license.
5) A Washington State pesticide license with an aquatic endorsement is also required for the purchase of aquatic herbicides. **NEVER apply non-aquatic herbicide formulations to water since many include ingredients toxic to aquatic organisms**.

Application Methods

1) Small areas can be successfully treated with one application, but larger areas may require several years of treatment to exhaust the seed bank.
2) Spot spray small infestations taking care to avoid damaging surrounding vegetation.
3) Herbicide application prior to covering or sheet mulching can increase efficacy of those methods. Allow for enough time for the herbicide application to take effect so the read canarygrass is dead prior to mulching.
4) Small patches (less than 2 feet in diameter) can be tied in a bunch just before flowering, cut above the tie and then treated with a 33% glyphosate solution applied directly to the stems.
5) Wick-wipe using a wick-wipe tool or hand swiping.
6) Wick-wipers attached to a tractor can treat tall stands without affecting shorter vegetation underneath.

Specific Herbicide Information

1) **Glyphosate** (aquatic labeled trade names include Rodeo ®, AquaMaster ®, Aquaneat ®, Glypro ®). Effective when applied in a 1.5 to 5 percent solution with a nonionic, surfactant (only use surfactants approved for use in aquatic areas by Washington Department of Ecology).

2) **Imazapyr** (aquatic formulations include Habitat ® and Polaris®). Effective when applied at a 1.5 percent solution with a nonionic surfactant (only use Ecology-approved aquatic surfactants). Imazapyr remains active in soil for some time and may cause collateral damage to nearby vegetation, including trees. Recommended only when applied to a RCG monoculture where the site will not be replanted until the following growing season or later. Conducting a soil bioassay prior to planting is recommended to avoid any residual effects from the herbicide in the soil.

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. Additional information and recommendations can be found in the references listed at the end of this document. **For questions about herbicide use, contact the King County Noxious Weed Control Program, Washington State Department of Agriculture or Washington State Department of Ecology.**

Biological Control

- There is no known biocontrol at this time.

BEST MANAGEMENT PRACTICES

Reed canarygrass is widespread in King County, and eradication is unlikely in all but the most isolated locations. Reinfestation is likely unless control, monitoring and maintenance are carefully planned and implemented. Successful long term control will follow these steps:

1. **Prevention**: If you have a wetland dominated by native plants, monitor the edges and immediately remove any reed canarygrass you find. Avoid disturbing the wetland.
2. **Remove existing plants:** Follow the recommendations below that best suit your situation to remove or kill all existing reed canarygrass plants in the infestation. Generally work first in least infested areas, moving towards more heavily infested areas.
3. **Deplete seed bank:** In all but early pioneering infestations the seed bank should be depleted if at all possible before replanting the area (if necessary). Allow seeds to grow and then remove the plants several times over at least two seasons for best results. Seeds can remain viable for up to four years.
4. **Revegetate** with shade-producing or highly-competitive native or other desirable species. Choose plants that will thrive in your location. Best results are obtained with a planting plan that will ultimately establish a multi-layered shade canopy, preferably coniferous, but lighter shade or other plant communities can reduce the impact of reed canarygrass. Consult a restoration specialist for assistance with your area.
5. **Monitoring and maintenance** of any controlled site is imperative until desirable vegetation becomes well established. Any site left unmaintained will revert back to reed canarygrass within a few years.

Permits may be required for some control techniques and some situations. See Control Information section above for more information.

Small Infestations

- **Manual:** Not practical for any but the smallest patches. Hand dig when the ground is soft. Be sure to remove all roots and rhizomes. Any roots or rhizomes left in the soil will resprout. Monitor the site for regrowth. Properly dispose of all removed plant material.
- **Shade:** Cover with shade cloth or sheet mulch with several layers of cardboard and four to six inches of wood mulch. Leave in place for at least one growing season. Monitor the edges for shoots coming up from lateral growth of rhizomes. Efficacy can be increased by pre-treating with herbicide (allow enough time for the herbicide to kill the reed canarygrass before covering), flaming, or removing above ground plant material at or just after flowering, either with hand tools or a line trimmer. Properly dispose of all removed plant material.
- **Burn**: Flaming using hand-held weed torch (many varieties available online) may be possible in some situations. Remove dead stems and thatch as much as possible prior to flaming to reduce threat of smoke and fire. Flame emerging shoots frequently during at least one growing season to weaken and kill roots. Monitor site for regrowth.
- **Chemical:** Spot spray or wick wipe with approved aquatic herbicide just past flowering stage when maximum energy has been depleted from the root system.

Large Infestations / Monocultures

Multiple methods will be required in most situations for large infestations.

1. **Remove or kill established plants.** Depending on feasibility, site conditions and resources, use mowing, cultivation, flooding, burning or herbicide alone or in combination. Research has demonstrated that the following combinations work in many situations:
    - Mow at least 5 times per year for several years.
    - Mow in late spring and again in August, spray in October-November, repeat for at least three growing seasons.
    - Mow or burn in late spring, then cultivate repeatedly (every two weeks). Repeat at least two growing seasons.
    - Spray in late spring and late fall for at least two growing seasons.
    - Cultivate, then flood: Cultivate as soon as possible in spring; be sure to get entire sod layer. Allow sod to dry out, repeating cultivation throughout growing season to ensure thorough drying of the entire infestation. At the end of the growing season, flood to at least 18 inches through late spring the following year.
    - Where manipulation of water levels is possible, flood to at least 32 inches (0.85m) and maintain that depth for at least one growing season. Use other methods to control around the edges of the flooded zone. If using flooding only, additional seasons may be required, or other methods should be used to control regrowth after water levels drop.

- Note: mowing or burning alone fewer than 5 times per growing season has been shown to INCREASE reed canarygrass density.

2. **Eliminate seed bank.** This may not be necessary if long-term goal includes establishment of multi-layered canopy for shade, however it is critical if shade establishment is not planned. Seeds remain viable for up to four years. Allow seeds to germinate and then control the seedlings in one of the following ways:
    - Cultivate repeatedly over at least two growing seasons
    - Flame or apply herbicide to seedlings as they emerge
    - Flood the area where seedlings are present
3. **Establish desirable vegetation.** Shading is the best long-term control strategy. Where possible, establish a multi-layered dense canopy, preferably with conifers in the overstory.
4. **Live willow stakes** installed 2 to 3 feet (0.60-0.91 m) apart in areas of shallow inundation or high soil moisture content can diminish RCG within two growing seasons.
5. **Monitor for regrowth/reinvasion and maintain site.** Control regrowth and re-infestations using techniques for small patches.

Control in Irrigation Ditches

For control of reed canarygrass in the maintenance of agricultural ditches, follow the recommendations in the **Manual of Best Management Practices for Maintenance of Agricultural Waterways in King County**.
http://www.kingcounty.gov/environment/waterandland/stormwater/agricultural-drainage-assistance/waterway-maintenance-bmp-manual.aspx .

Control Along Road Rights-of-Way

- Follow appropriate recommendations as described above for small or large infestations.
- Spot spray infestations in mixed vegetation, taking care not to spray beneficial plants.
- Do NOT mow plants in seed.

Disposal Methods

- Above-ground vegetative plant parts can be composted in a professional composting facility.
- Many plant parts will form roots if left in contact with moist soil. If composting on site, dry thoroughly on a tarp or black plastic before composting.
- Plant parts can be burned where conditions allow. Follow local burn regulations
- Rhizomes, plants in seed, and sod should be disposed of in a landfill.
- All plants parts, including seed, roots and sod, can be buried a minimum of two feet deep in weed-free soil. Buried RCG must remain undisturbed for at least four years.

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