



King County

Department of
Natural Resources and Parks
Water and Land Resources Division

Noxious Weed Control Program

BEST MANAGEMENT PRACTICES

Milk Thistle
Silybum marianum
Asteraceae

Class A Noxious Weed

Legal Status in King County: Class A Noxious Weed (non-native species designated for eradication by Washington State Law RCW 17.10 and by the King County Noxious Weed Control Board). The King County Noxious Weed Control Board requires property owners to eradicate milk thistle on public and private lands throughout the county. Eradication is legally defined as the elimination of a noxious weed within an area of infestation. State quarantine laws prohibit transporting, buying, selling or offer milk thistle for sale or distribute plants, plant parts or seeds.



BACKGROUND INFORMATION

Impacts and History

- Serious threat to livestock. Milk thistle is a nitrate accumulator. Ingestion by grazing animals causes nitrate poisoning, which can be lethal.
- Leaves become palatable in the early wilting stage after herbicide application, mowing or during drought.
- Spines can cause injury to livestock.
- Forms dense stands that shade out forage species and exclude livestock.
- Date of entry into the United States is unknown. Currently reported from many western states including Washington, Oregon and California. Also reported in the southern and northeastern United States and in most provinces of Canada.
- First reported in King County in 1999 from an urban medicinal garden. Believed to have been introduced into the southeastern part of the county through contaminated hay in 2001.

Description

- Tap-rooted winter annual or biennial herb. Sparsely branched thistle growing up to 6 feet tall and forming dense stands.
- Each solitary flower head can reach 2 inches in diameter and has purple flowers.
- Flower heads are surrounded by stout leathery bracts which are tipped with spines up to 2 inches long.
- Leaves are dark green with distinctive white marbling. The marbling follows the veins and appears as if someone had poured



milk on the leaves, hence the common name. Leaf margins are tipped with spines up to ½ inch long.

- Rosettes leaves are large, up to 10 inches wide and 20 inches long. Rosettes can reach 3 feet in diameter.
- Seeds are heavy (20 mg) and fall close to the parent plant. Seeds are dark brown and about ½ inch long.



Rosette

Habitat

- Typically found in full sun or partial shade in pastures, on roadsides and on soils with high nitrogen content.
- Most often found in pastures with high levels of nitrogen (e.g. dairies) and disturbed areas within those pastures.
- Also found on roadsides and fields, and in ornamental/medicinal gardens.

Reproduction and Spread

- Reproduces by seed. Plants that go to seed die at the end of the season.
- **Plants can flower from April to October.**
- Seeds are heavy (20 mg) and have a deciduous pappus which means most seeds fall near the parent plant. Seeds can be dispersed for longer distances by animals, on equipment and vehicles, and in hay. Large plants may produce more than 6,000 seeds.
- Unopened, fully formed flower buds will produce seeds if left attached to the plant.
- Seeds can be viable for at least 9 years. Tilling, overgrazing or other soil disturbance will cause these dormant seeds to germinate.
- Seeds germinate throughout the year in western Washington. Seeds germinate whenever temperature (32° to 86° F) and moisture conditions are favorable.



Germinating seedling

Local Distribution

The heaviest concentrations of milk thistle are in livestock grazing areas near Enumclaw in southeastern King County. Milk thistle is also found on several county roads near Enumclaw, a few sites in northern King County, and in medicinal and ornamental gardens in Seattle and other cities in the county.



Milk thistle by fence at a dairy in Enumclaw

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 that 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

- Survey area for weeds, set priorities and select best control method(s) for the site conditions and regulatory compliance issues (**refer to the King County Noxious Weed Regulatory Guidelines**).
- Small infestations can be effectively dug up. Isolated plants should be carefully removed in order to stop them from infesting a larger area.
- For larger infestations, the strategy will depend on the land use of the site. In pastures, good grazing practices and management for grass and forage species will greatly improve control of milk thistle. Specific suggestions are given in the Best Management section.
- Generally work first in least infested areas, moving towards more heavily infested areas.
- Minimize soil disturbance to avoid creating more opportunities for seed germination.

Early Detection and Prevention

- Milk thistle is easier to find once it flowers. Monitor pastures, areas used by livestock, and roadsides for new populations of milk thistle in **May, June and July**.
- Dig up isolated or small populations. If there are more rosettes than you can remove manually, it may be necessary to treat the area with an appropriate herbicide in the spring. Selective herbicide applications in the fall will reduce the number of germinating seedlings the following spring.
- Prevent plants from spreading away from existing populations by washing vehicles, machinery, boots and animals that have been in infested areas.
- If animals are being moved from an infested pasture to an un-infested pasture, first hold them for at least five days if possible so that the seeds pass out of the animals' digestive system.
- Manage pastures for grass cover and minimal soil disturbance.

Manual

- **Dig up the plants whenever you see them.** Milk thistle can be easier to find once it flowers. This can occur from April to October. Remove plants before they flower.
- Plants in flower can form viable seeds even after they are dug up, so carefully bag and dispose of all flowering plants, especially later in the season when seeds are beginning to

form. If the plants are in seed, it is very difficult to bag the seed heads without dispersing the seeds. In these cases, carefully cut off the seed head and place in a bag to prevent dispersing the seeds.

- In areas where mature plants are removed, there are usually many small rosettes and seeds left in the soil. Carefully search the area for rosettes or germinating seedlings and dig them up. Completely removing plants is easiest when the soil is loose or wet.
- Return to the same location later in the spring and in the fall to remove plants coming up from seeds already in the soil and continue to monitor the area for several years.
- The use of hand mechanical tools is allowable in all critical areas in unincorporated King County. For other areas, check with the local jurisdiction about any restrictions.

Mechanical

- Mowing will **not** eradicate milk thistle effectively. Plants are able to re-sprout and flower again in the same season when mowed. Plants that are regularly mowed can persist as short-lived perennials or can flower below the level of the mower. Milk thistle plants that are pushed over by the tires of the tractor will often still go to flower.
- Mowing may increase the amount of toxin ingested by grazing animals because milk thistle becomes more palatable as it wilts.
- Mowing may spread flower heads, which can form viable seeds, to new areas.

Cultural

- In pastures, good grazing practices and management for grasses and forage species will reduce the opportunity for milk thistle to spread or become established.
- Minimize soil disturbance and re-vegetate disturbed areas to reduce seedling germination.

Chemical

- 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 and grazing restrictions.**
- For your personal safety, at a minimum, wear gloves, long sleeves and pants, closed toe shoes, and appropriate eye protection. Follow label directions for any additional personal protection equipment needed.
- For herbicide use in critical areas and their buffers, certain restrictions apply depending on the site and jurisdiction. In unincorporated King County, refer to the **King County Noxious Weed Regulatory Guidelines** for a summary of current restrictions and regulatory compliance issues. Elsewhere, check with the local jurisdiction.
- For control of large infestations on roadsides and other areas, herbicide use may be necessary. For milk thistle, it is most effective to apply a selective broadleaf herbicide and surfactant in the spring and again in the fall. Infested areas should not be mowed until after the herbicide has had a chance to work.
- For several years following treatment, monitor areas for new plants germinating from the seed bank.

Specific Herbicide Information

Selective Broadleaf Herbicides (such as aminopyralid, 2,4-D, metsulfuron and dicamba) are most effective when milk thistle is growing in a grassy area. The addition of a suitable non-ionic surfactant to the herbicide will help penetrate the thick leaf cuticle and improve results. Re-treatment later in the season and in the fall is necessary to eradicate plants missed by the initial application and late-germinating plants. Continue to monitor for new plants for at least nine years after the initial treatment and following any disturbance to the soil such as overgrazing or vehicle tire ruts. **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.**

Selective herbicides that are effective on milk thistle include 2,4-D (many products), aminopyralid (Milestone), clopyralid (e.g. Stinger or Transline), dicamba (e.g. Vanquish or Banvel), metsulfuron (e.g. Escort), and combination treatments of 2,4-D and aminopyralid or 2,4-D and clopyralid. If livestock are present, check the label for grazing restrictions and damage to forage plants. If hay is to be harvested from treated areas for mulch or compost, make sure to follow label restrictions on timing. Aminopyralid, clopyralid, 2,4-D, dicamba and metsulfuron can harm certain grasses, alfalfa, clover and other legumes.

Timing

Apply selective herbicides with a non-ionic surfactant in the spring before any flowers appear. The best control is early in the spring after growth begins. Aminopyralid, clopyralid or a 2,4-D+aminopyralid or 2,4-D+clopyralid formulation can be effective through bolting but prior to bud development. Fall applications of aminopyralid or clopyralid after rains have initiated seed germination are effective in reducing the number of seedlings and reducing the seed bank. Aminopyralid and clopyralid have some soil residual activity that provides extended control of germination, but must be used only on permanent pastures, rangeland or non-crop areas. Aminopyralid does not have any grazing restrictions. Apply herbicide on warm days when winds are low. Check label for specific information on wind and rain guidelines.

Glyphosate: can effectively kill milk thistle and any other vegetation including grass. Treatment with glyphosate needs to be combined with effective re-vegetation of the site to prevent milk thistle seedlings from re-infesting the area. Monitor the area for germinating seedlings or plants missed by the initial application.

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 206-296-0290.**

Biological

- Biological control is not recommended for milk thistle in Washington State as eradication is required. Population density and the number of flowering plants can be reduced but there will always be some plants remaining when using biological control agents.

- The seed head weevil (*Rhinocyllus conicus*) is not recommended for redistribution because it attacks a number of native thistles and USDA does not allow interstate transport of this insect.

SUMMARY OF BEST MANAGEMENT PRACTICES

Small Infestations in Native and/or Desirable Vegetation

- Dig up plants.
- Replace any divots created when removing the plants to lessen the amount of disturbed soil.
- If using herbicide, apply appropriate product and surfactant by spot spraying to minimize off target injury.
- Monitor site throughout growing season and remove any new plants.
- If using an herbicide in a grassy area, use a selective herbicide with a non-ionic surfactant to avoid injury to the grass.
- If using herbicide where livestock are present, be aware of grazing restrictions and damage to forage plants.



Milk thistle rosettes in a pasture

Large Infestations/Monocultures in Grassy Areas

- Mowing is not effective for eradicating milk thistle. Mowing can be used if the infestation is found later in the year to keep the plants from flowering until an approved control method can be used. Do not mow milk thistle that has formed flowers or gone to seed.
- Large infestations can be controlled with selective herbicides. (See the Chemical section of this BMP). Re-treatment later in the season and again in the fall is necessary to eradicate plants missed by the initial application and late-germinating plants. If livestock are present, be aware of grazing restrictions.
- If plants are about to flower, cut and bag the flower heads and dig up the plant. Chop the plant into small pieces or bag the plant. Dispose of flower heads and plants in household garbage. Do not compost.
- Suppression of large infestations of milk thistle with a selective herbicide and surfactant will greatly increase grass production, which in turn increases the suppression of the milk thistle.
- Promote healthy grassy areas by seeding and fertilizing. Use a mix of grass and clover species to provide a competitive ground cover to suppress milk thistle germination. Fertilize according to the soil needs.
- If grassy area is used for grazing, the area should be managed to promote grass and clover vigor. Graze uniformly and move animals from area to area in a planned sequence leaving at least 3 inches of grass in each area. Avoid grazing when soil is very wet because holes can be opened up to new weed infestations.
- Minimize soil disturbance and re-vegetate disturbed areas.

- Be sure to monitor for milk thistle on edges of pastures, manure lagoons and disturbed areas around fences and watering holes. Remove isolated plants before they flower.

Control in Riparian Areas

- Additional permits may be required for control of infestations in riparian areas. See Noxious Weed Regulatory Guidelines for more information ([http://dnr.metrokc.gov/wlr/lands/weeds/pdf/Noxious Weeds Regulatory Guidelines.pdf](http://dnr.metrokc.gov/wlr/lands/weeds/pdf/Noxious_Weeds_Regulatory_Guidelines.pdf)).
- When large areas of weeds are removed, the cleared area needs to be replanted with native or non-invasive vegetation and stabilized against erosion. Refer to the King County Surface Water Design Manual for further information about sediment and erosion control practices (call 206-296-6519 or go to <http://dnr.metrokc.gov/wlr/Dss/Manual.htm> for information).
- Survey area and document extent of infestation.
- Focus on manual removal for small infestations if possible.
- Mowing will not eradicate milk thistle.
- For larger areas where herbicide use is warranted, apply with a spot sprayer using low pressure and large droplet size.
- When large areas of weeds are removed, the cleared area needs to be replanted with native or non-invasive vegetation and stabilized against erosion.
- If a non-selective herbicide is used in grassy areas, the area should be re-seeded to prevent reinvasion by weeds.
- Infested areas will need to incorporate a management plan lasting for several years to eradicate plants germinating from the seed bank.

Control Along Road Rights-of-Way

- Dig up small infestations.
- Spot spray with glyphosate if weeds are in areas with no desirable grasses.
- If plants are in grassy areas, use a selective broadleaf herbicide and surfactant; if sprayed with a non-selective herbicide, re-seed after control is completed.
- If plants are about to flower, cut and bag the flower heads and dig up the plant.
- Infested areas will need to incorporate a management plan lasting for several years to eradicate plants germinating from the seed bank.

Milk Thistle Disposal Methods

- Bag all flower heads and buds. If the plants are in seed, carefully cut off the seed head and place in a bag without dispersing the seeds.
- Dispose of flower heads and plants in household garbage or take to a transfer station for disposal. **Do not compost or put in yard waste.**
- If plants are not in bud, flower or seed, it is acceptable to chop up plants and leave on-site. Do not leave the plants where grazing animals have access to them.

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