



Class B Noxious Weed



Legal Status in King County: Class B Noxious Weed (non-native species designated for control by 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 control and prevent the spread of sulfur cinquefoil on private and public lands throughout the county. Control is defined by state law as the prevention of all seed production.**

BACKGROUND INFORMATION

Impacts and History

- Has invaded habitats ranging from low to high elevation, from seasonal wet meadows to shrubland and forest ecosystems and does not appear to be limited by soil type.
- Able to invade rangeland areas that are in good condition and not being over-grazed.
- Can significantly reduce the forage value of a pasture or rangeland and is one of the last plants to be grazed by animals.
- Even without over-grazing, it can out-compete grasses and other plants.
- Although most often found in disturbed areas, it has also begun to invade native plant communities that are relatively undisturbed by human activities including open canopy forests, forest openings and logged forests in the western United States.
- Originally from central Europe, Asia and the Middle East.
- Appeared in North America sometime before 1900.
- By 1950, sulfur cinquefoil was well established in the eastern U.S. and Canada and starting to spread west. The weed was first reported in Washington in 1937 and was reported from 12 counties in the state by 1996.
- Its rapid spread is similar to that of spotted knapweed and leafy spurge even though it was introduced several decades later.



Description

- Perennial with a woody rootstock producing one to several erect stems, 1 to 3 feet in height. Stout, hairy, leafy stems are un-branched up to the flowers.
 - Flowers have five butter-colored or light yellow, heart-shaped petals surrounding a darker yellow center.
 - Leaves have stiff hairs and are palmately lobed with five to seven long leaflets that are uniformly toothed along the edges.
 - Seeds are tiny, dark brown with prominent branched ridges and narrow winged margins.
- Plants typically have a deep taproot surrounded by shallow, spreading branch roots.

Habitat

- Adapted to a wide range of conditions but typically found in grasslands, shrubby areas, logged areas, roadsides, abandoned fields and open forests.
- Found in King County in open grassy areas and with shrubs such as Scotch broom, along railroads and roads, in pastures and abandoned fields.
- Can take advantage of poor soils and disturbed sites but is also successful in moist fields and can out-compete healthy pasture grasses.

Reproduction and Spread

- Regenerates annually from new shoots emerging from the edges of the root mass. Typically **flowers from early June through July with seeds beginning to form in mid to late July.** Reproduces by seed but can spread by roots if moved by mechanical equipment.
- Able to produce many flowers and seeds in early stages of succession. Small infestations with only a few scattered plants can rapidly increase in size and density.
- Stems that are knocked to the ground can produce roots at the nodes. Plants that are cut down will produce new shoots from the rootstock.
- Seeds can live 4 or more years in the soil.

Local Distribution

There are sulfur cinquefoil infestations in most of the cities and rural areas of the county, from Milton to Woodinville and Skykomish, on city, county and state roadsides and on private properties. Most of the sites are in the east part of the county although there are some in the more urban areas. Infestations range in size from small to large, well-established infestations.

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

- 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. Be sure to remove as much root as possible.
- For larger infestations, the strategy will depend on the land use of the site. In pastures, good grazing practices and management of grass and forage species will greatly improve control of sulfur cinquefoil. Specific suggestions are given in the Best Management section.
- Generally work first in least infested areas moving towards more heavily infested areas.
- Minimize disturbance to avoid creating more opportunities for seed germination.

Early Detection and Prevention

- Sulfur cinquefoil is difficult to spot in tall grass unless it is in flower. Survey pasture areas, unmanaged grasslands, roadsides and railroad rights-of-way for flowering and pre-flowering plants from **late May to late June**.
- Dig up isolated or small populations. The site should be monitored over several years for plants growing from any root fragments and from the seed bank.
- Prevent plants from spreading away from existing populations by washing vehicles, boots and animals that have been in infested areas. Seeds are small and are easily carried in mud and in animal fur.
- If animals are being moved from an infested pasture to an uninfested pasture, first hold them for at least five days so that the seeds pass out of the animals' digestive system.

Manual

- **Dig up plants in the spring or early summer when the soil is still moist and before the seeds mature.** Typically this is from early June through July. The roots are deep and extensive. Plants will re-sprout from root fragments. Remove as much root as possible.
- If plants are in seed, carefully bag and cut off the seed heads before digging up the rest of the plant. It is very difficult to pull the plants without dispersing the small, lightweight seeds. Brush off boots and clothes before leaving the infested area.

- In areas where mature plants are pulled, there are usually many seedlings and seeds left in the soil. Carefully search the area for seedlings and dig them up. Roots break off easily and re-sprout with new plants, so use a digging tool.
- Return to the same location in the following spring and summer to remove plants coming up from seeds already in the soil and continue to monitor the area for several years.
- Hand pulling and the use of hand mechanical tools is allowable in all critical areas in unincorporated King County.

Mechanical

- Mowing, will **not** control sulfur cinquefoil effectively. Plants have massive, woody root system that store considerable food reserves and mowed plants will send up new shoots after mowing.
- Mowed plants respond by becoming lower growing, more branched, and with more bulky, spreading roots. Plants can still re-sprout, flower and set seed in the same season they are mowed. If you do mow, be sure to clean mowers to prevent spreading seeds to uninfested areas.
- A single plowing may increase sulfur cinquefoil cover, however, on productive agricultural sites, an intensive management program that combines cultivation and annual crops will effectively control sulfur cinquefoil.

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.**
- Herbicides may be used in accordance with Federal and State Law in critical areas and their buffers with certain restrictions. Refer to the **King County Noxious Weed Regulatory Guidelines** for a summary of current restrictions and regulatory compliance issues.
- For control of large infestations on roadsides and other areas, herbicide use may be necessary. Infested areas should not be mowed until after the herbicide has had a chance to work and the green vegetation is brown and has died back.
- For several years following treatment, monitor areas for new plants germinating from the seed bank.

Specific Herbicide Information

Glyphosate: Currently, there isn't any information on the effectiveness or timing for glyphosate treatments (e.g. Roundup). The plant's ability to grow and flower into the late summer and even early fall suggests that glyphosate with a good surfactant could be effective for late summer or early fall applications. Treatment with glyphosate needs to be combined with effective re-vegetation of the site to prevent sulfur cinquefoil seedlings from re-infesting the area.

Selective Broadleaf Herbicides: (such as triclopyr, 2,4-D and dicamba): Treatment with selective herbicides is most effective in the spring or early summer. Fall applications can be somewhat effective because of the tendency of sulfur cinquefoil to "green up" when the rains return in the fall. **NOTE:** Restrictions apply for products containing 2,4-D and triclopyr BEE (e.g. Curtail,

Amine 4, Weed-B-Gon, Garlon 4, Crossbow) refer to **King County Noxious Weed Regulatory Guidelines** for further details.

- Dicamba combined with 2,4-D Amine is effective on rosettes and seedlings in the spring and much less effective on mature and flowering plants. Products with a combination of dicamba and 2,4-D Amine include Weedmaster, Veteran 720 and Weed-B-Gon Concentrate. Banvel (dicamba) can be combined with 2,4-D Amine but Banvel alone does not provide satisfactory control.
- 2,4-D Ester is effective on the rosette to the bud (pre-flowering) stages.
- Metsulfuron (found in Ally, Escort and other products) is somewhat effective at higher rates but can injure grasses. Metsulfuron can be applied at the flowering stage but may be less than 50% effective.
- Examples of rates that have been effective on sulfur cinquefoil are: Banvel at 1 pint per acre plus 2,4-D Amine at 1 quart per acre; 2,4-D Ester at 2 quarts per acre; and Ally at 0.8 ounce per acre.

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.**

Biological

- There are no biological control agents currently available for sulfur cinquefoil.

Summary of Best Management Practices

Small Infestations in Native and/or Desirable Vegetation

- Carefully dig up the plants being sure to get all of the root.
- Replace any turf damaged when removing the plants to lessen the amount of disturbed soil.
- Apply appropriate herbicide with wick wiper or by spot spray 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 to avoid injury to the grass.

Large Infestations in Grassy Areas

- Mowing is not effective for controlling sulfur cinquefoil. 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 sulfur cinquefoil that has gone to seed.
- Large infestations can be controlled with selective herbicides. (See the Chemical section of this BMP).

- Suppression of large infestations of sulfur cinquefoil with a selective herbicide will greatly increase grass production, which in turn increases the suppression of sulfur cinquefoil.
- Promote healthy grassy areas by seeding and fertilizing. Use a mix of grass and clover species to improve resistance to sulfur cinquefoil. 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. Avoid grazing when soil is very wet because holes can be opened up to new weed infestations. Some winter grazing by smaller animals can stimulate growth of clover and improve grass health.
- Continually monitor area - especially disturbed places - for sulfur cinquefoil. Remove isolated plants before they flower.
- If needed, apply a nitrogen fertilizer after the selective herbicide application and then manage grazing so that 4 to 6 inches of grass re-growth remains at the end of the growing season so that grasses can effectively resist re-invasion by sulfur cinquefoil.
- Overgrazing will allow for rapid spread of sulfur cinquefoil in pasture areas. Only goats have been known to graze sulfur cinquefoil. Other livestock will avoid sulfur cinquefoil unless it is the only forage available.

Control in Riparian Areas

- Survey area and document extent of infestation.
- Focus on manual removal for small infestations if possible.
- Mowing will not control sulfur cinquefoil but it can serve in the interim until more effective control measures can be utilized.
- For larger areas where herbicide use is warranted, apply with a wick wiper or spot spray 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 needs to be re-seeded to prevent reinvasion by weeds.
- Infested areas will need to incorporate a management plan lasting for several years to control plants germinating from the seed bank.

Control Along Road Rights-Of-Way

- Dig up small infestations if possible.
- Spot spray with glyphosate if weeds are in areas with no desirable vegetation.
- If plants are in grassy areas, use a selective broadleaf herbicide; if controlled with a non-selective herbicide, re-seed after control is completed.
- If plants are about to flower, they can be mowed until a more effective control strategy can be used.

References

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- Pacific Northwest Weed Management Handbook. 2006. Oregon State University.
- PNW Extension Bulletin 376. 1991. Sulfur cinquefoil
- Montana State University Extension Bulletin 109. Sulfur cinquefoil biology, ecology and management in pasture and rangeland.
- Washington State Noxious Weed Control Board. 1994, 1998. Written Findings.