

Guidelines for mulching in Garry Oak and associated ecosystems

Restoration plans and invasive plant management prescriptions often recommend mulching. But what is mulch, and how should it be used in Garry Oak and associated ecosystems? The following guidelines answer these questions and provide references for more information.

What is mulch?

Mulch is any type of material that is spread or laid over the surface of soil as a protective cover. Organic mulches (i.e., made from once-living organisms) slowly decompose by weathering and micro-organisms into various nutrients that plants need. Examples of organic mulches include chopped or partially decomposed leaves, chipped clean wood, cardboard, shredded or whole layers of newspaper (no glossy inserts), grass clippings that are free of chemicals and weeds, conifer needles, and clean straw.

Inorganic mulches include landscape fabric and plastic sheeting, as well as stone, rock chips, gravel, and pebbles. Inorganic mulches are not generally suitable for restoration work. They do not decompose and do not add organic materials or nutrients to the soil, although some do change soil pH as they weather.

Some erosion-control blankets or mats can also perform as mulch. They are manufactured from a mix of straw, coir, and propylene or other materials and can be planted into.

Mulch is not the same as compost, which is a mix of decayed and decaying organic matter specifically used to add nutrients and structure to soil. Mulches can contain compost as well as other organic materials.

Benefits of mulching

- Organic mulch improves soil fertility. **Note: this is not always appropriate for Garry Oak ecosystems; see “Disadvantages” below.**
- Organic mulch improves soil structure by allowing soil micro-organisms to recolonize.
- Protects bare soil from providing a medium for the germination and growth of weeds and invasive exotic plants. Mulch shades the soil surface, thereby inhibiting germination of some weed seeds.
- Reduces erosion by deflecting the impact of raindrops, reducing the velocity of moving water, and holding soil in place.
- Improves water infiltration and reduces evaporation of moisture from the soil surface, which is important for new plantings. As organic mulch breaks down, it improves drainage in clay soils, and moisture retention capacity in sandy loam soils, which drain quickly.
- Smothers and kills turf and some invasive grasses, mainly through shading. Mulch also makes it easier to remove weeds.
- Protects plants from effects of wind (e.g., desiccation, physical damage).
- Prevents soil from forming a crust by improving soil texture and porosity.

- Keeps soil warmer in winter, cooler in summer and minimizes soil temperature fluctuations (i.e., moderates soil temperature), particularly in fall and winter when frost-heave can damage new plantings.

Disadvantages of mulching

- Prevents germination and establishment of native seed that falls on top of mulch.
- Does not kill deeply rooted perennials, particularly rhizomatous grasses, and may even facilitate the survival and spread of these plants.
- May contain seeds and plant fragments of invasive exotic plants and weeds.
- Cardboard and newspaper contain certain chemicals that may be detrimental to plants and soil micro-organisms, especially if no other soil amendments are used.
- Many Garry Oak ecosystem species are adapted to low nutrient conditions. As organic mulches decompose, they deliver nutrients to the soil, creating conditions that favour non-Garry Oak ecosystem species and triggering successional change. For this reason, it is recommended not to add unmixed compost or manures (see “How much mulch” section about mixing compost with leaves).
- Mulching covers soil too deeply for solitary bees to burrow into. Unlike honeybees, most of our native bee species are solitary ground nesters and require access to bare soil for nesting.
- Male butterflies require open mud puddles for congregation leading to mating; mulching covers these important features.
- Mulch creates cover for rodents and insects, allowing them to eat seeds without being exposed to predators.
- Mulch increases project cost, although this may be offset by avoiding the cost of plant replacement due to mortality.
- Mulch is difficult to transport, especially to remote locations.

Mulching Best Management Practices in Garry Oak ecosystems

Mulching is appropriate in managed Garry Oak sites such as demonstration gardens or very degraded areas with compacted soil that have little existing native vegetation and need to be entirely replanted. Mulching is not recommended for natural areas or in relatively intact ecosystems.

- Mulch should only be used in sites that are monitored at least two times per year so that undesirable seed germinants can be removed before they establish.
- Mulching is not recommended for natural areas that will not be replanted or monitored, even if native plants are nearby. Undesirable weed species are more likely to establish in these mulched areas than native plants.
- Retain nesting habitat for ground nesting bees and other pollinators by leaving a minimum of 30% of the soil un-mulched, including some depressions for puddles.
- Mulch should be free of weeds, chemicals (especially pesticides), and green manures.

- Chopped and/or partially decomposed oak leaves are best for fall mulching or covering areas that have been cleared but not yet planted. If you can't get that, then use chopped and/or partially decomposed mixed deciduous leaves. **Note: Do not use large maple leaves unless they are chopped (e.g., place in a large garbage can and use a weed-whacker to break up). Bigleaf Maple and large leaves of other maples will mat together and not break down, forming a barrier to moisture penetration.**
- Leaves mixed with chipped wood from cut trees or limbs (except for lumber products, and preferably not conifer leaves, or Western Redcedar, any type of Cedrus or Sequoia material) are acceptable for fall mulching of established tree and shrub plantings (see "When..." below).
- For dry sites, chipped bark or wood (e.g., coarse sawdust) can work well because the high carbon-to-nitrogen ratio of wood and bark minimizes undesirable nutrient inputs into the soil. The breakdown of these materials will tie up excess soil nitrogen.
- Depending on the tree species, arborist's wood chips (chipped trees) can make useful mulches in urban and disturbed areas if leaf mulch is not available. Arborist's wood chips usually include all parts of the tree (branches, stems, leaves). These tissues are rich in lignin, suberin, tannins, and other decomposition-resistant compounds. Therefore, they decompose slowly and supply nutrients gradually. At the same time, they absorb water that is then slowly released to the soil. Chipped tree mulch has been effective in helping trees and native plants establish in urban and disturbed environments. **Note: do not use chips of invasive alien tree species such as Common Hawthorn (*Crataegus monogyna*), English Holly (*Ilex aquifolium*), or Tree of Heaven (*Ailanthus altissima*), because the chips might include viable seed.**
- Sheet mulching, or lasagne mulching, uses layers of newspaper (no glossy inserts) or cardboard. This method is used to prepare areas for planting that are not being dug over as a preliminary step. Sheet mulch can be applied directly over a lawn or old field, and can be effective for controlling Reed Canarygrass. Before placing the layers, mow the area and manually remove any large perennial weeds. For directions on how to sheet mulch, see the references at the end of this document.

When and when not to mulch

- Add mulch in fall after the rains have begun and when the soil is no longer dry from the summer drought. The mulch will provide an insulating blanket for the winter and prevent frost heave, especially around new plantings.
- Add mulch in spring after the soil has warmed and has begun to dry out somewhat from the winter rains.
- Limit the use of mulch in natural areas that have an established and undisturbed ground cover of native species.
- If you are removing small patches of invasive plants within a relatively intact natural area, cover the bare patches with partially decomposed leaf litter carefully gathered from nearby sites rather than using mulch brought in from elsewhere.
- Do not apply mulch over entire area; leave some bare soil for ground nesting bees and other insects that require bare soil for part of their lifecycle. Monitor these locations to ensure that weeds have not taken over these bare patches.
- Re-mulch every two to three years for the best weed control results.

How much mulch?

- If you are planning to broadcast seed the area with native seeds, use mulch depth of 4 cm (1") or less.
- For areas recently replanted after clearing invasive or other undesirable plants, or on top of newspaper/cardboard (sheet mulching) add 5–8 cm (2–3") of dense mulch (e.g., Garry Oak leaves mixed with compost), or 20 cm (8") of compressed Garry Oak leaves.
- Around shrubs in areas that have lawns, or in old fields, apply 10–30 cm (6–12") of light, fluffy mulch— ideally, mostly oak leaves but you can mix other deciduous leaves with Garry Oak leaves.
- In garden applications for species that require good drainage, gravel mulch (small, round pea gravel approximately 1 cm diameter) can be used in rockery areas by placing around crowns of perennials such as *Dodecatheon* spp., *Delphinium menziesii*, and *Sedum* spp. Apply to a depth of 2–3 cm (¾"). This will also keep the roots cool in the heat of summer.

How to apply mulch

- Depending on what type of plants are already on site, either fork or rake over the area.
- Spread the mulch to the appropriate depth (see above).
- Keep mulch at least 10 cm (6") away from the base of trees and shrubs.
- If applying in a restoration site (i.e., not a garden), keep the surface rough and irregular, especially if the site is sloped. This will further deter sheet erosion and create micro-climate sites and a variety of micro-habitats.
- Do not smother annuals or perennials; spread the mulch around and under the crown but do not cover growing tips. For annuals that have set seed, do not bury with mulch or germination will not occur.

Resources

- United States Forest Service. The Art and Science of Restoration. The Wilderness and Backcountry Site Restoration Guide, Chapter 3. www.fs.fed.us/t-d/pubs/htmlpubs/htm06232815/page13.htm#3121a.
- Is mulch a good idea? www.wvu.edu/~agexten/ageng/resource/mulch.htm.
- Does mulch improve plant survival and growth in restoration sites? www.cfr.washington.edu/research/factSheets/38-mulch.pdf.
- General mulch guidelines: eap.mcgill.ca/publications/eap64.htm.
- Sound Native Plants: Mulches for restoration and mitigation projects. www.soundnativeplants.com/PDF/Mulches.pdf.
- Arborist Wood Chip Mulches—Landscape Boon or Bane? www.puyallup.wsu.edu/~Linda%20Chalker-Scott/Horticultural%20Myths_files/Myths/Wood%20chips%202007.pdf.
- How to make sheet or lasagne mulch:
 - organicgardening.about.com/od/startinganorganicgarden/a/lasagnagarden.htm.
 - www.neighborhoodnotes.com/news/2011/11/lasagna_mulching_create_spring_garden_beds_in_fall.

Garry Oak Ecosystems Recovery Team—Mulching Guidelines

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