

Lawn

aeration and topdressing

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Lawns may deteriorate over time due to excess thatch, soil compaction, or a combination of the two. Aeration helps to manage thatch buildup and reduce problems arising from soil compaction. Proper aeration can help build a thicker, healthier turf with superior resistance to weeds, diseases, and insect pests. Core aeration (cores of soil are pulled from the ground) can even help smooth out a turf surface. Most lawns will benefit from being aerated every 1–5 years, with the frequency determined by the rate of thatch production and soil compaction. Compacted or thatchy sites will need more frequent aeration to correct the existing problem, up to twice a year for 1 or more years. This bulletin will help you decide if aeration is necessary, understand how it improves a lawn, and determine when is the best time to aerate. It also describes the types of soil aerators that are available.

Topdressing turf refers to the application of a thin layer of soil to smooth out the turf surface. This bulletin describes why topdressing is

used and when it is appropriate, topdressing methods, and how to select a suitable topdressing material.

Does my lawn need to be aerated?

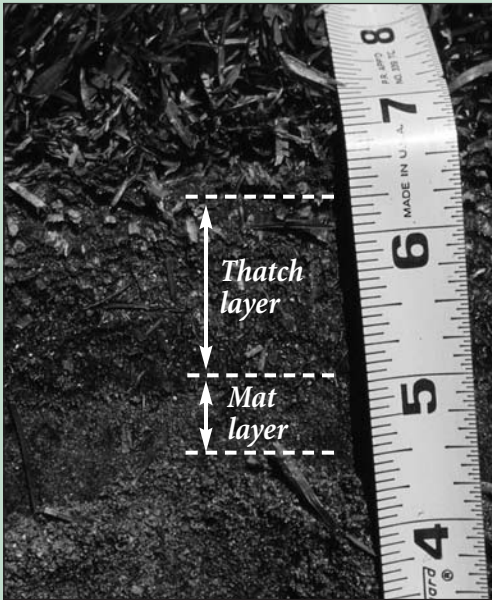
While aeration is beneficial for many lawns, it isn't appropriate for every situation. In some cases, it can do more harm than good.

When aeration is needed:

- When soil is compacted.
- When the thatch layer is more than 1-inch thick.
- Before overseeding a turf. Aeration exposes soil and provides better seed-to-soil contact needed for good establishment. (See Extension publication *Lawn Establishment and Renovation*, A3434, for information on overseeding.)

When aeration is not needed:

- When the soil is not compacted. Sandy soils generally don't become compacted and rarely need to be aerated.
- When the thatch layer is less than $\frac{3}{4}$ -inch thick. A moderate layer of thatch is beneficial to grass plants. It protects the growing point of the grass plant, reduces soil water loss, and moderates changes in soil temperature.
- Bunch-type grasses such as tall fescue and perennial ryegrass do not produce thatch and recover slowly from aeration. If this type of grass is aerated to solve a soil compaction problem, overseed immediately to help thicken the turf quickly and minimize potential weed problems.



What is thatch?

Thatch is a layer of dead and living organic matter above the soil surface. It is the accumulation of underground stems (rhizomes) and above-ground stems (stolons) produced by spreading-type grasses such as bluegrass (Kentucky, rough, supina), red fescue, and creeping bentgrass. Bunch-type grasses such as tall fescue and perennial ryegrass do not produce thatch. Grass clippings do not contribute to thatch buildup. The mat layer lies just below the thatch. This is a transitional layer where soil and decomposing thatch are mixed together. The mat layer helps to buffer grass roots from rapid environmental changes.

To determine the thickness of the thatch layer in your lawn, remove a small triangular section of turf (3 inches long, about 2 inches deep) from the lawn with a pocketknife. Look for a layer of brown root and stem tissues between the green turf leaves and the soil. Measure the thatch layer with a ruler, ignoring any portion containing soil, brown roots, and stem tissues (this is the mat layer).

How does aeration benefit turf?

Reduces thatch-related problems

Aeration helps lawns by breaking up the thatch layer. Excess thatch (more than 1-inch thick) may harbor insects and diseases, prevent pesticides from reaching the pests in the soil such as grubs or crabgrass seed, and reduce the effectiveness of fertilizers and watering. In addition, grass roots are more likely to grow into thick thatch than into soil. When this happens, the grass becomes more vulnerable to drought, heat, and cold stress because environmental conditions change more quickly within the thatch layer than in the soil.

Reduces compaction problems

Compacted soil limits water infiltration, reduces availability of oxygen to roots, and physically restricts root growth. (The ground is compacted if you cannot push a pen into dry soil.) Aerating opens holes, allowing oxygen and water to move into the soil. The aeration holes, or channels, provide a haven for root growth. The accelerated root growth improves nutrient and water uptake. This in turn stimulates grass growth and results in a denser turf which helps to crowd out weeds.

Types of aerators

A wide variety of aerators are available. Some equipment is best suited for reducing soil compaction problems, others reduce the amount of thatch only, still others do both. The type you use will depend on need and availability. To obtain an aerator, contact a rental agency, professional landscaper, or equipment company.

Hollow tine (core) aerators

Aerators that remove plugs of soil, or cores, are called hollow tine or core aerators. This is the most effective type of aerator for thatch management and provides temporary relief from soil compaction. Allow the cores to dry for 1–2 days, then mow to help break them up. The cores generally take several days to a few weeks to fall apart, depending on rain, mowing, and traffic on the turf. Regular use of core aerators—up to one to two times annually—can help smooth a soil surface over several years as the soil from the cores washes into low spots in the lawn.

There are two primary designs of core aerators: drum (roller) units and piston types. Drum units have either conventional hollow tines or tines shaped like spoons. Most drum units are designed to be pulled with a small tractor or similar vehicle, although self-propelled models are available. The tines of drum units enter the soil at an angle, creating elongated shaped holes. By contrast, the tines of piston-type aerators enter and exit the soil in a vertical motion, leaving round holes. As a result, piston types disrupt the turf surface less than drum units. Most piston-type aerators extract 3-inch cores, while drum units rarely penetrate more than 2 inches, particularly if the soil is dry. The depth which any aerator will penetrate depends on the length of tines used and the soil moisture (dry soil may be too hard for tines to penetrate; extremely wet soils may prevent removal of cores). Remove cores as deep as possible, usually 3 inches. If irrigation lines or other items are buried less than 3 inches deep, adjust the depth if possible or avoid aerating these areas. Drum units are the most common type of aerator available at rental agencies.

Solid tine aerators

Solid tine aerators punch holes in the soil. The tines are 3–4 inches long and ¼–1 inch in diameter. This type of aerator temporarily improves water movement into the soil. Solid tines are less effective than hollow tines at thatch management since they do not bring soil to the surface to mix with the thatch and produce the mat layer. In addition, they may increase compaction because the soil is pushed downward instead of being removed.

Slicers and spikers

Slicers and spikers are simple devices consisting of a roller with round spikes (usually called a spiker) or triangular knives or discs (usually called a slicer). These aerators are typically non-motorized devices pulled by a utility vehicle. The names are sometimes used interchangeably or may be combined (slicer/spiker). Slicers cut narrow grooves while spikers poke small holes (less than ¼-inch diameter and often less than 1 inch deep) into the soil. Slicers are most useful on high-traffic areas such as athletic fields for temporarily improving water movement into a compacted soil during midsummer while causing minimal disruption to the turf surface. Conventional core aeration exposes significantly more soil to the air and can cause the turf to dry out and die if performed during hot, dry periods. Spikers and slicers can be used to break up a soil surface to prepare the soil for overseeding. Some seeding units have a spiker or slicer built into them to cut small holes or narrow grooves into the soil to improve seed to soil contact which is essential for good establishment. Since slicers and spikers bring little thatch or soil to the surface, they have limited effectiveness at breaking down thatch or reducing soil compaction. Shoes with spikes on the soles are totally ineffective for aerating the turf.

Vertical mowers (dethatchers)

Vertical mowers, or dethatchers, are motorized units with blades that cut straight down to pull thatch along with some turf leaves and soil to the surface. Use vertical mowers to quickly remove excessive thatch from a turf. If the mower allows, set the depth to minimize cutting into the soil. Rake and remove the debris. Vertical mowing will severely harm the appearance and density of the turf. If too much turf is removed, overseed to thicken turf and prevent weeds from filling in bare areas. Vertical mowers can be rented from many hardware stores, garden centers, and rental agencies.

When to aerate

During periods of active growth, grass can quickly fill in the openings in the turf left by the aerator. The best time to aerate lawns in Wisconsin is in early autumn (September 1–30) when grass is actively growing. Lawns may also be aerated in mid- to late spring (May 1 to June 15), but during this period, weed seeds are germinating and aeration may encourage their growth as well. Fertilize the turf following aeration to encourage rapid turf recovery (refer to Extension publication *Lawn Fertilization*, A2303, for additional information).

Aerate when soils are slightly moist but not overly wet. Aerators will become bogged down in wet soils and little benefit will be gained. Dry soils may be so hard the tines of the aerator may not penetrate the soil. If the soil is dry, water lawns thoroughly 1–2 days before aerating. Recently aerated lawns may look rough and in poor condition. If lawns are aerated when grass is actively growing, lawns will quickly recover with proper mowing and regrowth.

What is topdressing?

Topdressing is the application of a thin layer of soil (usually no more than ¼–½ inch) to a turf. Topdressing is an effective way to modify thatch and smooth the turf surface. Golf course putting greens and tees and athletic fields are often topdressed to provide a uniformly smooth playing surface.

Topdressing is quite expensive and requires a soil type that will not interfere with drainage into the existing soil. Uniform, regular applications of topdressing are rarely appropriate for home lawns, although small additions to selected sites can help correct constantly wet areas or particularly bumpy lawns.

Selecting and ordering soil

Locating a suitable topsoil is difficult. Use a soil type that matches the underlying soil to prevent layering (e.g., use silt loam topdressing if the existing soil is also a silt loam). If you are not sure of the soil type, send a soil sample to the University of Wisconsin soil analysis lab or other lab for analysis, or consult a reputable professional landscaper or lawn care service.

Check the topsoil before purchase to ensure there are no large rocks, debris, or noxious weeds, including quackgrass rhizomes. Avoid soils from farmland as they may contain agricultural chemicals that can kill turf (e.g., atrazine). Composts should be used cautiously—if at all—due to extreme variation in content. Some composts may seal off the soil, preventing air and water penetration which is necessary for turf root growth. “Black dirt” or muck soil is organic soil consisting of highly decomposed material. An unmixed layer of black dirt will prevent water from draining deeper into the soil, resulting in a wet area and often killing the turf.

To order the correct amount of topdressing, determine the amount of surface area to be covered then multiply by the depth (in feet) of topdressing desired. For example, if applying $\frac{1}{4}$ inch of topdressing to a 10,000 ft² lawn, the total amount required is 200 ft³ ($0.02 \text{ ft} \times 10,000 \text{ ft}^2 = 200 \text{ ft}^3$). Since topsoil is usually sold by the cubic yard, divide the cubic feet by 27. (In this example, $200 \text{ ft}^3 \div 27 \text{ ft}^3/\text{yd}^3 = 7.4$, or about 8 cubic yards).

How to topdress

Professionals often use specialized equipment called topdressers. These units may be self-propelled, mounted, or attached to a utility vehicle. These units are not generally available to homeowners, and would usually be too difficult to use on a home lawn due to the trees and other landscaping features.

For topdressing large areas of home lawns, use a large drop spreader. You can also use a shovel to fling the topdressing material. Large dips or swales may also be corrected by adding soil to the area using a shovel. The topdressing must be fairly dry or it will not spread uniformly, regardless of the method or equipment used.

At least half of the leaf height should be visible or the turfgrass may be killed by lack of sunlight. Several soil additions may be needed over a period of several months, allowing the turf to grow up through the newly placed soil between addi-

tions. If the turf is buried, overseed the area to prevent weeds from becoming established (see Extension publication *Lawn Establishment and Renovation*, A3434, for details).

Small areas of a layered soil caused by incompatible soil types will usually not be noticeable in a home lawn when the turf is cut at $2\frac{1}{2}$ inches or higher.

For large areas, use a core aerator to partially mix the newly added soil with the underlying soil. The mixing will produce a transition layer that will improve water movement from the surface to the subsoil. Several passes with the aerator may be needed. Add soil and aerate only during periods of active turf growth; do not do this during hot, dry periods or when the turf is dormant.

How to smooth a bumpy lawn

Bumpy lawns may be caused by a variety of factors such as frost-heaving in the spring, moles, ant mounds, ruts from equipment, and rocks that were not removed before establishment. In some cases, a sparse lawn consisting of bunch-type grasses (ryegrass or fescue) can feel bumpy as soil collects around the base of each plant. The following steps will help to smooth bumpy lawns:

- 1. Determine the cause.** You may be able to take preventive steps to keep the bumps from recurring. For example, soils with a thin turf

covering are more subject to frost-heaving than soils with a dense turf covering. Improving management techniques will help to limit heaving.

- 2. Core aerate the lawn.** Aerate in the fall or spring when turf plants are actively growing.

- 3. Allow cores to dry, then use a drag mat to pull the cores across the lawn.** As the cores disintegrate, the soil will fall to the lowest areas. A drag mat can be made using an old box spring mattress or a weighted section of chain link fence.

- 4. Roll the lawn when the soil is moist.** Rollers can be rented from hardware stores and other dealers that handle lawn care equipment. Note that rollers can hurt turf growth by compacting the soil. If you notice compaction problems, you may need to core aerate the turf again.

- 5. If needed, topdressing can be applied to localized areas.** If an extensive amount of topdressing is applied and the soil types are incompatible, you may need to core aerate the area two to three times to help mix the two soils.

- 6. If the turf is sparse, overseed the area following aeration,** then drag the area and/or lightly roll the turf to ensure good seed to soil contact. See *Lawn Establishment and Renovation* (A3434) for additional details.

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