

Aerifying and Dethatching Lawns

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Lawns in Kentucky will occasionally suffer due to compacted (hard) soils and excessive thatch layers. Although most lawns will not have problems with these issues, you may occasionally need to dethatch or aerify (core) to maintain a high quality lawn.

What is Thatch?

Thatch is a tightly intermingled organic layer of dead and living shoots, stems, and roots that develop between the green vegetation and the soil surface (Figure 1). A thatch layer will develop when organic matter (dead shoots, stems, roots, leaves) is produced more quickly than it is decomposed. Because leaf clippings are mostly water, they do not account for a significant portion of the thatch layer. In fact, as clippings break down, they return nutrients to the soil and should not be bagged (for more information see *Mowing Your Kentucky Lawn* [AGR-209]). A neglected lawn will never accumulate thatch; a higher input lawn may. Thatch most frequently develops when:

- No earthworms are present in the soil. As earthworms burrow they improve

soil oxygen and promote microorganisms, which break down organic material.

- Lime has not been applied to correct an acidity problem. Microorganisms are most active and effective in breaking down organic matter when the soil pH is in a somewhat neutral range (6.0–8.0).
- Very high rates of nitrogen fertilizer are applied year after year. High nitrogen causes excessive growth from roots and stems that cannot be quickly broken down by microorganisms. Some nitrogen sources will cause the soil pH to become more acid, thus also promoting thatch development.
- Kentucky bluegrass is grown rather than tall fescue. Kentucky bluegrass produces rhizomes (underground stems) that take time for microorganisms to break down.

A little thatch is desirable because it helps moderate temperature extremes at the soil surface and provides a cushion effect on the surface. But an accumulation of a half to 1 inch of dense thatch creates problems because it interferes with water

and air movement into the soil and creates a favorable environment for insects and diseases.

Mechanical Dethatching

To combat thatch, use a dethatching implement or vertical mower that cuts through the thatch to the soil surface. As the implement or mower passes through the grass, dead and living organic material is cut, torn loose, and deposited on the surface. If a half inch or more of thatch is present, it may be necessary to cross the lawn two or three times in different directions. Operation of dethatching machines is relatively easy, since they are partially self-propelled. Most difficulty occurs on steep slopes or when soil is very dry.

Select a dethatching machine that cuts with knives or blades (Figure 2). Some machines have flexible, leaf rake-type tines that are ineffective in removing thatch. Spring tines that can be attached to your rotary mower blade are not good for dethatching either and can cause severe mower damage. Dethatching equipment can often be rented from lawn equipment rental companies.



Figure 1. Check for thatch by using a knife or soil probe to remove a core. The dense organic layer above the soil line in this image is a mixture of thatch, roots, and rhizomes.



Figure 2. A good dethatching machine has fixed knives or sling blades; spring tines are not effective.

The organic material dislodged by the dethatching machine should be removed and composted or discarded. It can be raked into piles or onto plastic sheets or a tarpaulin and placed in the yard waste bin or dumped in a truck. Several garbage bags or a full pickup load of thatch can be removed from just a small lawn (Figure 3).

Excessive Thatch

Thatch accumulations greater than 1 inch may be unmanageable by dethatching and/or core aerifying. In these cases, it might be best to renovate the lawn using a non-thatch producing species and also reconsidering and correcting the management factors that lead to the severe buildup of thatch.

When to Dethatch

Kentucky bluegrass lawns should be dethatched only in the fall or spring, never in summer. For bermudagrass, remove thatch in early to mid-summer. Tall fescue and perennial ryegrass turf never develop enough thatch to be a problem. Zoysiagrass may develop a serious thatch problem, but dethatching it is not recommended since zoysiagrass requires several months to recover.

Prevent Future Thatch Problems

You can reduce your need for dethatching by keeping up with the proper maintenance of your lawn (or neglecting it completely). Reducing the amount of fertilizer applied to the lawn and only applying during the fall will help produce the healthiest lawn possible without excessive thatch buildup. (Most cool-season lawns only require 2 to 3 lbs of nitrogen/1000 ft²/year.) Managing your soil pH in the proper range is important for microorganism activity. Test the soil in your lawn every three to five years. Do not apply pesticides that kill earthworms. If you are not sure if a pesticide is safe for earthworms, contact your local county extension office for clarification. Finally, slit seed a turf type tall fescue into a Kentucky bluegrass lawn. In time the lawn will be a mixture of the two species and the numerous benefits of the tall fescue will be realized.



Figure 3. A mixture of thatch, soil, roots, and stems removed with just one pass of a dethatching machine.

Soil Compaction

Compaction is a physical soil condition that results when soil particles are compressed. A force applied to the soil surface in the form of foot or vehicular traffic reduces macropore space between soil particles and the soil becomes a dense mass (Figure 4). As the soil becomes increasingly compacted, open spaces in the soil become limited, resulting in a reduction in space for water and air. Soil water is necessary for plant growth and nutrient transport. Proper aeration in the soil is needed for root growth (leaves need CO₂; roots need O₂), gas exchange (remove toxic gasses that can build up in the soil and replace with oxygen), and support of microbial growth. Compaction is usually confined to the top 3 to 4 inches of the soil. This area is also the zone of root growth. As soils become hard, they form a physical impediment to root growth. Shallow roots prevent water uptake and cannot withstand hot and dry conditions.

Compacted soils can occur more frequently in newer neighborhoods where topsoil was removed during construction. Often in these situations a small layer of topsoil was placed over subsoil prior to planting the lawn. Subsoils tend to be high in clay, which will compact more easily than loamy or sandy soils. Compaction is also accelerated when traffic occurs on wet soils.

Core Cultivation

Core cultivation is a term used interchangeably with the terms aerification or coring. This method of turf cultivation involves using equipment with hollow tines (Figure 5) or spoons to remove soil cores from the top 2 to 3 inches of soil and redeposit the soil cores on the surface (Figure 6). Good aerifiers are sometimes available from rental agencies, and most lawn care companies offer aerification.

In contrast to aerification, cultivation practices that do not remove soil (i.e., spiking and slicing) do not improve

Figure 4. Soils become compacted when force is applied to the surface and soil particles become compressed.

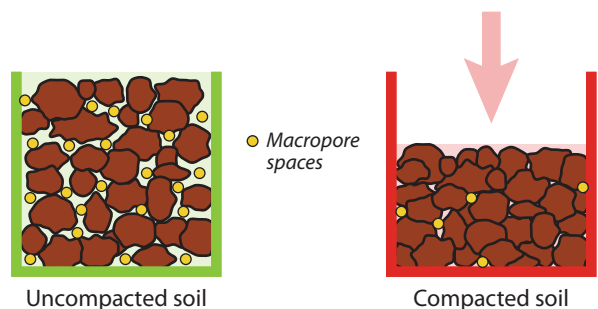




Figure 5. A common lawn aerifier available at rental agencies. This roller-type aerifier inserts tines as it rolls along.



Figure 6. Coring machines remove plugs of soil and grass and open up the soil for improved aeration and water infiltration.

Benefits of Coring

Increased

- water infiltration
- water percolation
- soil aeration/venting
- thatch decomposition

Decreased

- soil compaction

The cores that remain on the surface as a result of aerification will gradually be melted down by rainfall or irrigation—there is no need to remove cores as is often seen on golf courses. The soil that is brought to the surface will mix with thatch. The increased oxygen from aerification and the soil addition to the thatch layer helps soil microbes break down the thatch. Cores melting down on the surface is similar to topdressing—the process of applying light rates of soil or sand over the turf.

Thatch reduction occurs because the extracted soil mixes with the dead organic matter to create a natural compost. Further, the increased oxygen in the soil improves microbial activity that aids in thatch breakdown. During wet weather, however, the cores from heavy clays will be very sticky on shoes, clothing, and mowing equipment.

To make aerification worthwhile:

- Use the largest available tines or spoons (i.e., ¾ inch to 1 inch in diameter).
- Force the tines to penetrate 2 to 3 inches deep. There is little to no benefit if tines do not reach these depths. Aerify while the soil is slightly moist to improve tine penetration.
- Make 20 to 30 holes per square foot.
- Repeat the entire process two or three times a year. A single aerification is practically useless if the soil is sufficiently compacted.
- Carry out this process only when active turf growth is occurring (spring or fall for cool-season lawns; summer only for warm-season lawns). Since coring increases light penetration into the canopy, crabgrass and other weeds may germinate if quick grass recovery and fill-in does not occur.

compaction. They give little or no benefit and may actually increase surface compaction. Coring will:

- Relieve surface compaction in the top 1 to 2 inches of soil, which is important on heavily used lawns
- Improve soil aeration and water infiltration, especially on heavily used lawns and occasionally on moderate to steep lawn slopes where water runoff is rapid
- Reduce thatch accumulation



Figure 7. Check for compacted soil by trying to push the blade of a knife into moist soil with just the force of your thumb.

How Do I know if I Need to Dethatch or Core Aerate?

Dethatching and core aeration are both serious causes of stress to the lawn. If these cultivation practices are not necessary, avoid them. Excessive cultivation is just as bad as not enough. As was mentioned above, you can easily check for thatch depth by cutting out a small core of soil (or by inserting a soil probe) and measuring the layer on top of the soil surface. If the thatch is greater than half an inch, proceed with one of the thatch reduction methods detailed above.

Soil compaction is also quite easy to determine, and the most important thing to know about it is that it is not a common problem on lawns. If you frequently have dogs, kids, and/or heavy equipment running over the lawn (especially following rain/irrigation), compaction may be a problem. The easiest way to check is to insert a knife into a moist (not wet) soil. If you can insert the knife with just the force of your thumb, the soil is likely not compacted sufficiently to worry about (Figure 7). Dry soils (powdery when crushed in your hand) are always harder than moist soils, so do not perform this test without sufficient soil moisture.

Frequency of dethatching or coring depends on:

- **The turf**—Does it tend to thatch?
- **The soil type**—Is it a clayey subsoil or loam?
- **Your lawn management**—How aggressive are you with fertilizer and chemicals?

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