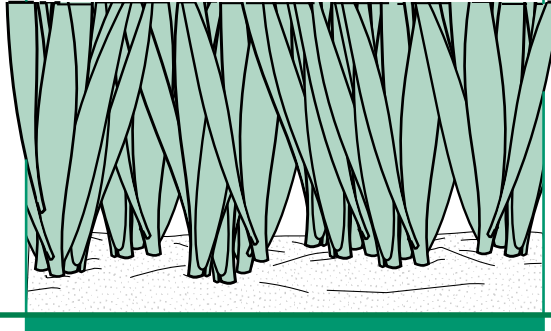


AERATING YOUR LAWN

Turfgrass



A healthy root system is a must for an attractive lawn. Oxygen in the soil is vital for healthy roots. Root growth is inhibited by clay and compacted soils because of a restricted oxygen supply. Aerating improves rooting and problem soils by allowing air into the soil. An aerator does this job mechanically without destroying the turf.

- Healthy roots are necessary for healthy lawns.
- Roots make up 90 percent of the grass plant.
- Roots take in oxygen and give off carbon dioxide.
- Restricted air movement into the soil reduces health and vigor of the turf.
- Aerating equipment mechanically improves the movement of atmospheric air into the soil and carbon dioxide out of the soil.

Lawn problems improved by aerating include thatch, poor drainage, heavy traffic, walking, playing and compaction caused by heavy equipment.

Some benefits of aeration are listed below:

- Loosens compacted soil
- Breaks-up and/or removes thatch
- Improves water infiltration
- Improves nutrient infiltration
- Increases oxygen supply to roots
- Releases carbon dioxide
- Encourages new, deeper root growth

Aeration Methods

The use of hollow tines to remove plugs of soil is called *core aeration*. This is the preferred aeration method, but the most destructive. *Spiking* involves the use of solid tines to make holes in the soil. This

method has a short-term effect. *Vertical mowing* or power raking is better on thatch but less effective at reducing compaction.

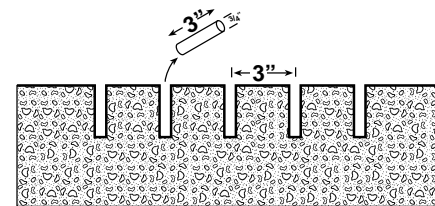
When to Aerate

Core aerating or vertical mowing for cool-season grasses such as bluegrass, fescue and ryegrass should be done in March, April or September. Bermudagrass, buffalograss, zoysiagrass and other warm-season grasses should be aerated late May through July. Spiking can be done anytime.

Aerating Guidelines

Aerator holes should be 3 inches deep, 3 inches or less apart, and about three quarters of an inch in diameter. Several passes will be needed for correct spacing. This should be done twice a year on a continual basis. The benefits of aerating are soon lost if the practice is discontinued.

Turfgrass must have a constant supply of fresh air moving to the surface of every living, growing root to replace carbon dioxide. Carbon dioxide builds up continuously and needs to be released from the soil. Air exchange, or aeration, takes place in spaces between the solid particles of soil.



Proper aerator hole size and spacing.

Aeration can be a natural occurrence between the soil and its surroundings. Temperature differences between the soil and the atmosphere may result in air movement. Water activity into and out of the soil will affect the proportion of air in the soil. But when these processes do not produce a sufficient amount of aeration for a lawn to stay healthy, lush and green, additional mechanical aerating must take place. Aerating should be as much a part of a lawn care program as mowing, watering and fertilizing.

Compaction, excess thatch, and clay soils cause weak-rooted lawns. At these stages, it is necessary to aerate mechanically. Replanting the yard may be another answer to severe compaction problems, but the soil will have to be modified first to exact a long-term solution.

Compaction

Compaction is the pressing together of soil particles, which squeezes air out of the soil. Most compaction occurs in the upper two inches of soil. The biggest cause of compacted soil is activity on soggy turf. Other causes include watering lawns and/or excessive tilling when preparing a seedbed. Construction and grading equipment used to build homes also has adverse effects.

Causes of Compaction

Children Playing	Upper 1 inch of soil
Dogs	Upper 1 inch of soil
Sports Activities (volleyball)	Upper 2 inches of soil
Parking Cars on Lawn	Upper 3 inches of soil
Heavy Construction Equipment	Upper 6 inches of soil

As soil is compacted, the soil's aeration process becomes ineffective. Air spaces are squeezed out and filled with water. At this point, the soil is waterlogged and unable to drain. Waterlogged soil promotes shallow root growth.

Compacted soil results in turf with low energy, poor growth, and thin yellow-green characteristics. It will not hold up well to traffic or weather stress. Playing on it would tear the turf more quickly than under normal conditions. Heat stress also causes the yard to wilt sooner. Under any of these conditions, recovery takes longer than it would for a healthy yard.

Thatch

Thatch is a compressed, light brown organic matter that looks like peat moss and is located between the soil line and grass blades. If this layer becomes thicker it will eventually stop air and water flow into the soil. Air, water, and nutrients are held in the thatch layer creating a shallow environment for root growth.

Contrary to popular belief, clippings do not contribute to thatch. Rhizomes and stolons, such as in bluegrass, buffalograss, bermuda and zoysia, are contributors.

To tell if thatch has reduced aeration, cut a small wedge of turf down to the soil with a knife. If the thatch layer is more than a half inch, the turf needs to be aerated.

Soil Types

The type of soil is another reason to aerate the lawn. Clay contributes to compacted soil. It has a fine texture with a sticky plate-like structure, and is most likely to become compacted. Clay soil needs to be improved before planting a lawn. To do this, add organic matter such as peat moss or compost to the soil.

There are two ways homeowners can find out the kind of soil on their lawns. By having a soil test done at the local K-State Research and Extension office, or by performing a squeeze test. Take a ball of moist soil and squeeze it in your hand. If the ball holds together, it's clay. If it breaks apart easily then it's loam. Sand falls apart most easily. This test works well for any flower bed, garden, or turf soil.

Benefits of Aeration

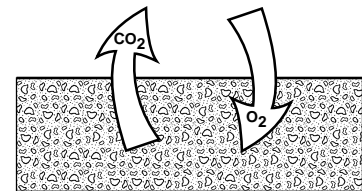
Aeration loosens compacted soil and breaks up thatch. It allows water and other nutrients to seep into the soil, encouraging new root growth and establishing a stronger, deeper root base for a lusher, healthier turf. Another benefit of aeration is the reduction of water runoff and puddling.

By removing cores of soil, aeration provides space for roots and soil to expand, reducing further compaction.

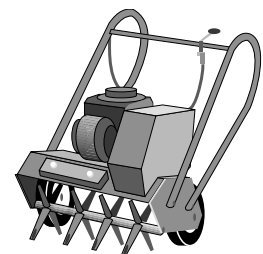
Aeration is also a method of thatch control, because the microorganisms brought to the surface of the lawn help break down thatch. All of these factors help the turf establish a deeper root base, making the lawn more heat- and drought-stress tolerant.

How Often to Aerate

How often to aerate depends on the type of soil and the amount of use. Bermudagrass, buffalograss and zoysia require more aeration than bluegrass or fescue to keep the thatch in check. Clay soils with a lot of use need to be aerated twice a year. Other soils with less activity should be aerated once a year. If there is excessive thatch build up, aerate more than twice a year.



Oxygen (O_2) and carbon dioxide (CO_2) exchange in the soil.



Aerator

Core Aeration

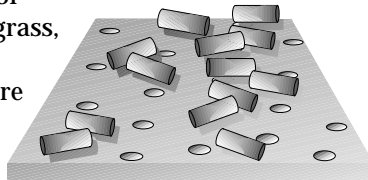
To aerate, use a core aerator with either hollow tines or metal tubes. Cores pulled out of the soil let air and water filter through the soil. These cores are $\frac{3}{4}$ inch in diameter, 2 to 3 inches deep, and 3 inches apart. Three or more passes over the turf are required for proper hole spacing. Soil moisture at the time of aeration is important. If it is too dry, the tines do not penetrate to a sufficient depth. If the soil is too wet, tines will clog and not deposit the cores on the soil surface. The weight of the machine must also be adjusted for the soil conditions. Having a professional aerate your lawn is recommended because this procedure requires special heavy duty equipment to penetrate the soil.



Aerator tines

When to Core Aerate

Core aeration can be done anytime the grass is actively growing. It is best to aerate once or twice a year on a continual basis. It takes three consecutive years for the yard to receive the full effect. For cool-season grasses (bluegrass, fescue, ryegrass), the best times to aerate are March, April, and September. This should be done before fertilizing, seeding or applying crabgrass preventers. Warm-season grasses (bermudagrass, buffalograss, zoysiagrass) can be aerated from late May through July. It is important to allow at least four weeks of good growing weather. This will give plants a chance to fill the open holes.



Cores on soil surface

Spiking

Spiking is the easiest and least expensive aeration method and is done by using a solid tine or a metal spike and putting an angular hole in the ground. Using this method, the turf heals quicker than with core aeration because no soil is being removed. Spiking can be done anytime of the year. But the effects of the solid tine method are short term. Another problem is that the soil is pushed to the sides of the hole compacting the area again.

Vertical Mowing

Vertical mowing or power raking is less effective in alleviating compaction but is an excellent means of reducing thatch, particularly for warm-season grasses. The process is less destructive than core aerate and is

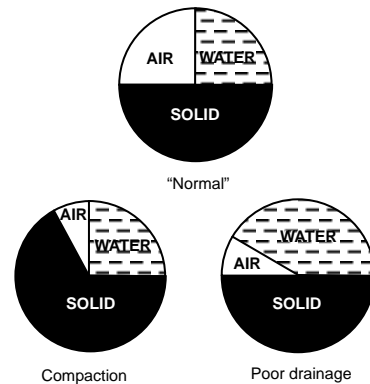
an excellent option if compaction is minimal. Equipment is available at most local rental centers.

Earthworms

Earthworms are helpful to lawns, because they are natural aerators and thatch controllers. The tunnels they create help loosen the soil. By digesting organic matter, earthworms keep thatch production in check.

Summary

Aeration is an important part of a lawn care program. For best results it should be incorporated with a total lawn maintenance program. There are no physical signs to indicate that a lawn needs aerating. Spending time on maintenance can make the difference in having to replant a lawn or not.



Comparison of normal and problem soils.

Matthew J. Fagerness
Turfgrass Specialist

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Kansas State University Agricultural Experiment Station and Cooperative Extension Service

MF-2130

January 2001

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