K-STATE Research and Extension

Aerating Your Lawn

MF2130

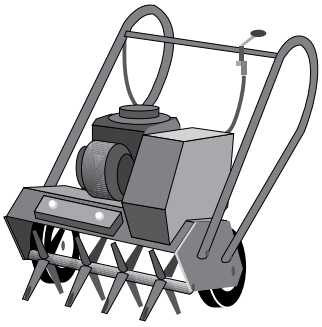
An attractive lawn starts with a healthy root system. Roots make up 90 percent of the grass plant and require oxygen to thrive. Soil compaction restricts the oxygen supply and inhibits root growth. Aerating, or moving air into the soil, loosens compacted soil and provides the following benefits:

- breaks up or removes thatch;
- improves infiltration of water and nutrients;
- increases oxygen supply to the roots;
- promotes carbon dioxide release; and
- encourages new and deeper root growth.

Aeration alleviates lawn problems such as thatch and poor drainage, and issues resulting from heavy foot traffic, field play, and compaction by heavy equipment. An aerator does the job mechanically with minimal damage to the turf, but there are other methods.

Aeration Methods

Core aeration, the use of hollow tines to remove plugs of soil, is the most effective, but it can damage the turf. Spiking or using solid tines to make holes in the soil, produces short-term effects. Vertical mowing or power raking works on thatch but is not as effective for reducing compaction. It is also the most destructive method, and turfgrass may have to be reseeded.



Aerator

When to Aerate

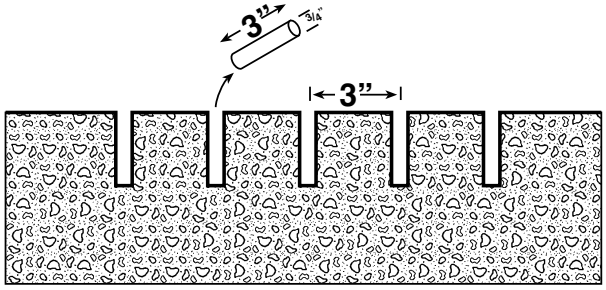
Core aerating or vertical mowing for cool-season grasses such as bluegrass, fescue and ryegrass should be done in March, April or September. Bermudagrass, buffalograss, zoysiagrass and other warm-season grasses should be aerated late May through July. Spiking can be done anytime.

Aerating Guidelines

Aerator holes should be 3 inches deep, 3 inches or less apart, and about ¾ inch in diameter. Several passes may be required for correct spacing. Aeration frequency depends on soil type, thatch, and traffic, among other factors.

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

Aeration occurs naturally when temperature differences between the soil and the atmosphere result in air movement. Water activity into and out of the soil also affects the proportion of air in the soil. When these processes do not lead to enough aeration for lawn to stay healthy, lush, and green, mechanical aeration becomes necessary. Aeration is as important in a lawn care program as mowing, watering, and fertilizing.

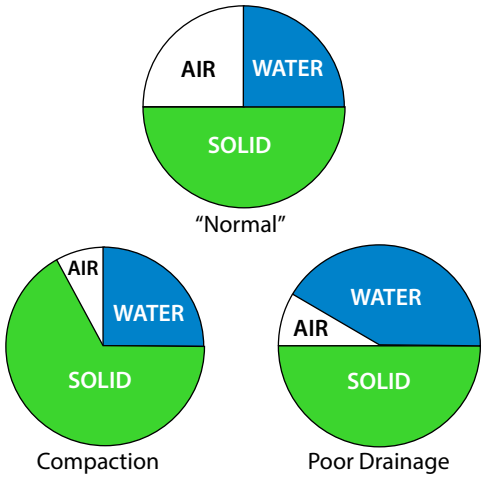


Proper aerator hole size and spacing

Compaction, excess thatch, and clay soils cause weak-rooted lawns. At some point it is necessary to aerate mechanically. Replanting the lawn may be another answer for severe compaction problems, but the soil should be modified first for a lasting solution.

Compaction

Compaction is the pressing together of soil particles, which squeezes air out of the soil. Most compaction occurs in the top 2 inches of soil. The main cause is activity on turf when soil is moist. Others include watering lawns or excessive tilling when preparing a seedbed. Construction and grading equipment used to build homes also has adverse effects.



Comparison of normal and problem soils

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 natural aeration process becomes ineffective. Air spaces are squeezed out and filled with water. Soil becomes 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 does 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 layer that looks like peat moss and is located between the soil line and grass blades. If this layer becomes thick, 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, bermudagrass, and zoysiagrass, 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 ½ inch, the turf needs to be aerated.

Soil Types

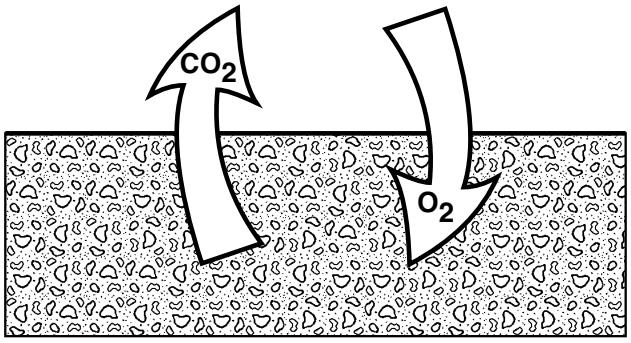
Soil type is another reason to aerate the lawn. Clay soil has a fine texture with a sticky plate-like structure and is more likely to become compacted. Clay soil should be improved before planting a lawn by adding organic matter such as peat moss or compost.

Homeowners can determine soil type by submitting a soil sample to the local K-State Research and Extension office or by squeezing a ball of moist soil in their hand. If the ball holds together, the soil is clay. If it breaks apart easily, it is loam. Sandy soil falls apart more easily. This simple 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.



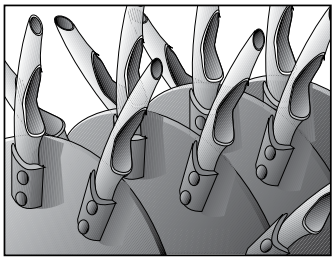
Oxygen (O_2) and carbon dioxide (CO_2) exchange in the soil

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.

Core Aeration

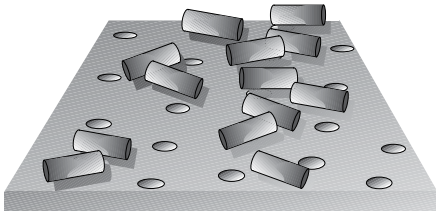
To aerate, use a core aerator with either hollow tines or metal tubes. Cores pulled out of the soil let air and water filter through the soil. These cores are ¾ inch in diameter, 2 to 3 inches deep, and 3 inches apart. Three or more passes over the turf may be required for proper hole spacing depending on the machine being used. 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) should 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 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 aeration. Spending time on maintenance can make the difference between having to replant a lawn or not.

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