

## Aerating Lawns

Homeowners often overlook problems associated with soil compaction. Soil compaction can severely restrict turfgrass growth and can arise in lawns from a variety of events. Traffic over a lawn or specific areas of a lawn is probably the leading factor in soil compaction. This traffic includes human activity, pet runs or vehicular movement. Soils can also become compacted during residential or commercial construction process due to movement of heavy equipment of the lawn. Insects, diseases, nematodes, improper watering, lack of fertilizer, and poor turfgrass management are often blamed for a lawns decline when the real culprit is soil compaction.

The problem starts when the top 4 to 6 inches of the soil become compressed or compacted. Over time, these compacted soils will tend to hold more water; however, water infiltration and percolation into and through the soil are greatly reduced. Reducing water infiltration into a soil will lead to water runoff and an increase in soil erosion. On level surfaces, reduced infiltration will cause ponding of water, increased water loss through evaporation, and an increase in disease pressure.

Reduced water percolation rates due to compaction, commonly termed poor drainage, will make turf management more difficult, especially with irrigation scheduling. During periods of continuous rainfall or on overwatered turf areas, the soil will remain wet. Under these conditions, soil compaction can increase if the traffic patterns are not adjusted, and the turf quality will decline due to a lack of soil oxygen and disease pressure.

When the soil dries during droughty conditions or following improperly irrigated turf, a compacted soil will be hard to wet because of poor water infiltration. This can lead to shallow root systems,

and a turfgrass that is prone to easily wilt. As the grass thins due to poor growing conditions, the bare soil will heat up during the summer months. This will not only contribute to a loss of turf, but inhibits new turf from creeping into the bare areas.

Turfgrass stress due to compacted soils will weaken the grass plants over time making them less able to compete with weeds and slow to recuperate from injury. In time a compacted lawn may need renovation. Be sure to not confuse a compacted soil with an inherently poorly drained soil, although both can occur simultaneously. Naturally occurring soils located in low areas, on flood plains, high in clay or in swampy locations will hold water but may not be compacted. Remediation of these growing conditions will be different than for a compacted area.

Compacted soil can also contribute to the accumulation of thatch. Restricted oxygen levels in highly compacted soils, due to the compaction itself or from poor drainage, impair the activity of earthworms and other thatch-decomposing organisms. Left unmanaged, thatch can lead to serious maintenance and pest problems. Thatch accumulates faster on compacted soils and heavy clay soils than on well-aerified soils. Therefore, alleviating soil compaction in lawns will aid in thatch control.

### Preventing Soil Compaction

Ideally, the best way to avoid turf problems due to compacted soils is to alleviate any compaction prior to turf establishment. However, this may not always be feasible. If the situation arises where an established turf is planted on a soil prone to compaction, consider the following tips:

- Analyze and monitor all traffic on the turf.
- Avoid continuous traffic patterns over the same turf area. This can include foot traffic, pet traffic or tire traffic.
- If heavy traffic is unavoidable, remove the turf from the area and replace it with a non-turf pathway such as permeable pavers, flagstone steps or mulch.
- Keep foot traffic off turf areas by using properly placed pathways and using landscape design that includes hardscape, as well as trees and shrubs, to direct traffic.
- Be careful when using large, heavy mowing equipment. Change mowing patterns often and use light weight mowing equipment when the soil is wet. Consider avoiding the use of heavy mowers altogether on compactable soils.
- Incorporate into your turfgrass management program one or more turfgrass cultivation practices. This can include core aeration, slicing or spiking. Of these, core aeration will be most effective.
- Keep in mind that one particular practice in itself may not be enough to relieve a compacted soil. It may take a combination of several to achieve the desired goal.

If a soil is compacted, the solution is straightforward: aerify. The practice of physically removing cores of soil and leaving holes or cavities in the lawn is defined as core aeration or aerification.

### Benefits of Core Aeration

- Loosens compacted soil and increases the availability of water and nutrients.
- Enhances oxygen levels in the soil, which stimulates root growth and enhances the activity of thatch-decomposing organisms.
- While removing cores of soil, the spoons or tines also sever roots, rhizomes and stolons. Grass plants are stimulated to produce new shoots and roots that "fill up" the holes in the lawn and increase the density of the turf.
- Reduces water runoff, increases water infiltration and percolation, and improves drainage.
- Increases the lawn's drought tolerance due to enhanced root growth and improves its overall health.



A core aerator for lawns pulls up plugs of soil.  
Gary Forrester, Regional Horticulture Extension Agent,  
Clemson Extension

### Timing

The type of grass will determine whether to aerify in the fall or in the summer. Lawns composed of cool-season grasses such as Kentucky bluegrass and tall fescue are best aerified in the fall, when there is less heat stress and danger of invasion by weedy annuals. Allow at least four weeks of good growing weather to help the plants recover.

Warm-season grasses such as zoysiagrass, centipedegrass, carpetgrass, St. Augustinegrass and bermudagrass, on the other hand, are best aerified in late spring and summer, when they are actively growing. With either type of grass, choose a day when temperatures are mild and soil is moderately moist, which makes the soil easier to penetrate. Avoid aerifying a wet soil, as it is messy and leads to further compaction of the soil as well. If the soil sticks to your shoes or if the soil core sample you take sticks to your probe, you should wait until it dries out some before starting the job. If aerifying in the summer during a droughty period, monitor your irrigation as an aerified turf will tend to dry out quicker than before the aerification process.

Aerification of home lawns will help correct soil compaction problems and the problems associated with compacted soils and should be considered a routine practice. The question usually asked is how often does a lawn need to be aerified. The best answer to this question is, "as often as needed." One way to determine if aeration is needed is by scouting the lawn. Take a screwdriver and probe the soil. If the screwdriver penetrates the soil with little resistance, then you probably don't need to aerify. If it is difficult to penetrate the soil with the

screwdriver, then you may need to aerify. Make sure the soil is moist when testing the areas, as dry soil can also be more difficult to penetrate. Inspect the overall appearance of the lawn and especially where the turf is thinning. Walk over the area and 'feel' the soil with your feet. If it feels like you are walking on concrete, then compaction could be a problem.

Turfgrass in high traffic areas may need aerification more often than the rest of the lawn. Turfgrasses with low traffic tolerance, such as centipedegrass and St. Augustinegrass may need aerifying more often than turfgrasses with good traffic tolerance, such as bermudagrass, zoysiagrass, tall fescue and some Kentucky bluegrass varieties. These high traffic areas can usually be done by "hand" as described in the next section.

Ultimately, the frequency of aerification will be determined by soil type and the amount of traffic over the turf. Poorly drained, heavy soils with heavy traffic will need more initial cultivation than turf planted on lighter soils with less traffic. These various conditions may require aerification from once every couple of years, to 2 to 4 times during the growing season.

### **Small Areas**

Aerification is not expensive. The simplest and cheapest way to aerify a small lawn is with a spading fork. Push the tines into the soil as far as you can (at least 4 inches) and rock the fork back and forth to enlarge the holes. This movement will loosen up the soil and make room for new grass roots. One limitation of using a spading fork is that as you make a hole, you are also forcing soil particles around the hole closer together, causing more compaction. This method is also rather labor-intensive for treating large areas.

For a few dollars you can purchase a sod-coring tool that does a better job. Like the spading fork, this tool is easy to use and ideal for small areas. Unlike the fork, the sod-coring tool removes cores of soil from the lawn instead of pushing the soil aside to create holes. The earthen plugs that are deposited on the lawn after each successive plunge actually benefit the lawn. They also contain microorganisms that help decompose any layers of thatch that are present. These cores can be broken up and raked into the lawn.

### **Large Areas**

Aerifying larger lawns requires a power-driven core aerator or aerifier, which can be rented at lawn and garden supply centers or equipment rental centers. The working parts of these machines are spoon-shaped tines or hollow tubes. As the tubes are driven into the lawn, cores of soil are removed from the ground and strewn across the lawn. Both types of tines work equally well, but the hollow tine makes a somewhat cleaner hole than the spoon type and brings up less soil. The tine size varies up to three-quarters of an inch and in depth of penetration up to 3 inches, depending on the manufacturer's specifications. A closer tine placement on the aerator removes more soil, exposes more soil surface area for water and fertilizer movement, and alleviates compaction better than a wider tine spacing.

Penetration depth depends on soil type, soil moisture, tine diameter, and the weight and power of the aerifier. Soil cores should be left on the lawn to be broken up by rainfall and traffic. If their appearance bothers you, you can speed up their disappearance by raking them into the grass. Whichever machine you use, go over the lawn twice, once in one direction, and then in a perpendicular direction for best results.



Soil cores pulled from the lawn during soil aerification. Gary Forrester, Regional Horticulture Extension Agent, Clemson Extension

## **Aerifying & Reseeding**

Aerification can be combined with seeding, particularly on sparse or bare areas. If you are going to seed the lawn, you should make six to 10 passes over the area with a machine. You need to produce a number of holes, at least 4 inches apart, to improve the appearance and density of the stand. Allow the holes about a month to heal before seeding. If you overseed immediately after coring, seeds that land in or near the aerifier holes will germinate and grow much better than those between the holes, giving the lawn an uneven, speckled appearance. With a fraction of the effort and expense of tilling up the entire area, combining aerification with seeding will give the lawn a brand-new look.

## **Aerifying & Weed Control**

When using a preemergent weed control program for annual weed control, do not apply a preemergent weed control product before aerifying. The aerifying process will open up the protective layer of herbicide and allow weeds to grow. Make all preemergent herbicide applications after a turf has been aerified.

To summarize, soil compaction is the hidden enemy to any lawn. Commercial as well as homeowner turfgrass managers need to be aware of the possible

problems associated with soil compaction. Once soil compaction becomes a problem, remediation can be a long process. The best approach to dealing with soil compaction is to prevent it from the beginning. Anticipate compaction occurrences and implement the proper turf cultivation practices to reduce the chance of turf failure.

Excerpted from Southern Lawns: *Best Management Practices for the Selection, Establishment and Maintenance of Southern Lawngrasses*, EC 707, 2003.

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