

Is Soil Compaction Killing Your Field?

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Soil Compaction can be a turf manager's worst nightmare. Under normal field use, player traffic pushes soil particles closer together, reducing pore space and increasing soil density. Most compaction from player use occurs in the top two inches of the soil. Compaction below this depth can be caused by such things as construction traffic, natural or man-made soil layering, and continuous cultivation to one depth.

The lack of pore space decreases the movement of air, water and nutrients and reduces percolation and infiltration. This restrictive soil environment forces turf roots to struggle to fill basic plant needs. The slower plant growth results in reduced turf quality and, for sports fields, less cushioning for players. The reduced root system means less stress tolerance and the turf is more susceptible to weed, disease and insect problems.

Unlike pest problems, nitrogen deficiency, or drought stress, the problem often exists long before the plant shows symptoms. So developing your own diagnosis system can be very helpful. Using something as simple as a soil probe or screwdriver can help determine when compaction is becoming a problem. You must recognize that soil moisture will significantly affect whether a soil feels compacted or not, so do your probing at a consistent soil moisture.

Aeration through coring, shattering, or slicing opens channels in the soil through which air, water and nutrients can move more freely. Water movement into (infiltration) and through (percolation) the soil are improved. Aeration increases pore space, softening hard soils by allowing the soil to move upon impact, an important factor for sports fields.

The degree of soil compaction varies with soil texture and soil moisture when the area is used, and the amount of weight applied. Soils high in silt and clay compact quicker than sandy soils, and wet soils compact faster than dry soils. So field use on wet

soils tends to result in more surface damage and in greater soil compaction than on dry soils.

Today many sports turf managers are becoming more concerned about having good aeration equipment than mowing equipment. Being able to reduce compaction problems can easily result in less water

use, less herbicide use, and better playing conditions because of the presence of a healthy dense turf.

Compare aeration alternatives with how hard the soil is, weather conditions, turf growth cycles, and field use schedules. Normal aeration

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penetrates into the top three or four inches of soil. Solid spike/tine aerators punch holes into the soil, creating openings without removing soil. Hollow tines or spoons remove a soil core which is deposited on the soil surface. In most cases, hollow tines or spoons are better. However, solid tine equipment that causes soil lifting and vibrating can be as effective or more effective than hollow tines. Deep aeration extends below the four-inch level and helps improve both surface and deep soil problems.

Ideally, the aeration method selected should reach the depth of compaction, yet cause no more surface disruption than desired. Equipment that brings soil to the surface is the most disruptive, but generally produces longer lasting results. Even when cores are dragged back in, the turf needs time to recover and grass roots need to regenerate and spread deeper into the soil. Because spiking and slicing is less disruptive to turf growth and appearance, it can be used more often than coring.

Best results will be achieved by using different types of cultivation at different times. The more disruptive aeration should be done before major root growth periods such as the spring and fall for cool season grasses, and spring for warm season grasses. Shallow aeration before deep aeration should make the two together more effective.

Proper soil moisture is critical to maximize cultivation effects. Dry soils are hard to penetrate, limiting the effect of the procedure and stressing equipment more. Wet soils may not move enough to achieve satisfactory results. Generally soil moisture

should be at field capacity for most aeration. For vibrating and shattering aerators the soil should be slightly drier. Field capacity is when all excess moisture is gone which is generally 24 hours after a rain or irrigation.

Hot, dry weather and strong winds may dry out the turf bordering aeration holes. Avoid aeration during such conditions or compensate for moisture loss with irrigation.

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