Aerification — A Comparison of Shattercore vs. Hollow-tined[1]

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Aerification has been a standard practice on all heavily trafficked turfgrass areas for many years. It is the major means of relieving surface compaction in the uppermost 2-3 inches of soil and mat. Aerification is essential not only to relieve compaction, but to promote faster water infiltration rates, maintain firm dry surfaces and to allow better gas (oxygen) diffusion into the soil. Aerification will also enhance root growth due to better oxygen relationships and a soil that has less resistance for root penetration.

Aerification is more essential on turfgrass areas that were established on soils of sandy loam texture or heavier than it is on those areas established on pure sand. We usually assume that infiltration rates of water and oyxgen diffusion rates are satisfactory in sands, although this can change with the accumulation of surface organic materials that are decomposing as well as accumulating as thatch. In this case, aerification also becomes essential. Native soils, due to their fine texture, have greater compactability than sands due to greater total pore space. When fine materials become packed tightly together, air spaces are essentially eliminated leaving only capillary porosity which increases the water holding capacity of the soils as well as increasing their density. The overall effect is poor root growth conditions and surface wetness.

In recent years an old concept of soil tined aerification has been modernized where solid tines are fitted into the Ryan Greensaire aerifier. These tines are bullet-nozed, generally of 1/2 inch and possibly 5/8 inch diameter, and are literally punched into the soil with the force of the downward thrust of the aerifier. Due to the rapid insertion and withdrawal of these solid tines, it is reported that hard compacted soils have become much softer, water infiltration rates have picked up, rooting has increased and overall turf quality has significantly improved.

Hollow tined aerification is the usual means of aerifying turfgrass areas. Problem putting greens with heavy soils, fairways, and sportsfields should be hollow tined aerified up to 4 times annually to help reduce compaction and maintain a better environment for root growth. Obviously, hollow tined aerification will increase water infiltration rates as well. In general, hollow tined aerification should be followed by sand topdressing to place as much sand down the holes as possible to maintain continuity of water flow to the surface. When aerifier holes close over at the soil surface with heavier textured soils, aerification is only a temporary effect.

We have some reservations with respect to hollow tined aerification. Therefore, we have initiated a research project to compare shatter core vs. hollow tined aerification to determine if there are any lone range problems associated with shatter core aerification. It is obvious that the downward thrust of a solid instrument through the soil must create some compaction at the bottom of the thrust. When a solid object is moved through the soil, there should be displacement in all directions. Although the upward thrust of the aerifier tine may loosen the soil throughout its length, it may not loosen the soil at the bottom

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(Shattercore cont'd.)

of the thrust creating a pan or compacted layer. No doubt, there is some compaction at the bottom of the thrust even on hollow tined aerifiers as well. Our objective, therefore, is to compare the two methods as well as combinations of the two methods. We will be measuring the parameters of infiltration and permeability rates of water, bulk density of the soil, and turf quality aspects.

There was excessive variability in the water infiltration studies, but this may change in another year, although there are some interesting trends. Bulk density of soils of this nature (silt loam) is a reasonably accurate measure of compaction. It is interesting to note that no aerification resulted in a lower bulk density than any aerification treatment. A bulk density value over 1.5 g/cc might indicate excessive compaction in a silt loam soil.

These data were developed from an area maintained as putting green turf, but without heavy traffic. It is probable that these values will change more within 2-3 years and even more so if traffic is applied.

Solubles Can Burn, But Insolubles Cannot

We all know that a dog's urine will burn grass. But why? There is nothing in the dog's urine that is toxic to the grass. It is all a matter of concentration. In other words, diluted dog's urine will not burn. What is involved is a physical-chemical principle of osmosis. The grass is a victim of reverse osmosis.

A simple explanation of osmosis is in order. Imagine two water solutions divided by a membrane. The membrane could be a piece of cellophane, or sausage causing which is the intestine of a pig, or any cellulosic membrane. This membrane is semipermeable, which allows soluble salts (ions) and water to pass freely through it. If the two solutions are at different concentrations, the salts will pass through at a higher rate from the more concentrated to the less concentrated, and water will pass through at a higher rate from the less concentrated to the more concentrated. This will continue until the concentration is the same on either side of the membrane.

In the case of the dogs urine, water flows out of the cellular walls from the inside of the plant into the dogs urine, and the salts the same, the cells will not collapse or swell due to osmosis (the movement of water and salts freely flowing through these membranes.)

The chemicals which the golf course superintendent is using can be divided into solubles and insolubles. If the chemical is insoluble in water, the manufacturer must micropulverize it to micron size and then add a wetting agent in order to get it to disperse in water so that the super can use it. But even though it is micropulverized it is so coarse that it cannot pass through the cell walls. However, if the chemical is soluble it is reduced in water to a molecular size which is still at least a million times smaller than the micron of the insoluble chemical. Then, and only then, can it pass freely in and out of the grass plant.

What we have learned from the discourse is that insoluble chemicals such as wettable powders or flowables cannot burn no matter how much is used because they cannot freely pass through the membrane or cell wall of the grass plant — not even the stomates. Whereas, solubles can burn if they are sprayed at too high of a concentration.

Credit: Divots 8/86

From the Diary of Cec. Kerr:

Most of the superintendents experienced severe drying out last winter with loss of grass on their fairways. Early growing conditions were not conductive to establishing new grass therefore recovery was extremely slow. It was extremely dry in April following winter desiccation. Poa annua seeded earlier than usual. Dandelions were prolific; high winds made spraying very difficult.

On May 14, 1986, John Ebel, Barrington Hills CC bent was successfully replacing Poa annua as a result of light weight mowing with Toro 84 and Toro greens mower.

Jim Evans, Turnberry CC Penn Eagle and seaside bent seeded September 4, 1985, was exceptional on May 14, 1986.

Rick Johnson has done a fantastic job of selling and improving the performance of the Jacobsen HF5, Mark and Chris are not taking a backseat. We are fortunate in this industry to have so many professional salesmen. We learn by working together.

Early June toured Peter Voykins, Twin Orchard CC with Wayne Trometer. It was a pleasure to witness such a beautifully groomed course.

In late May and early June golf courses in central Illinois and eastern Iowa were suffering from pink snow mold (Gerlachi Nivalis) if they failed to spray with Calo-Clor, this strengthened my belief in Calo-Clor.

Rick Tegmeier formerly superintendent of Hinsdale CC and Bill Byers, Des Moines G and CC showed me their outstanding fairways seeded to Penn Eagle following Roundup renovation. Rick Tegmeier has planted wild flowers in the roughs and planted several memorial flower beds in honor of deceased members.

July 1st, Mike Hart, Bon Vivant CC was experiencing problems with "Take all Patch" (Ophiobous Patch, Gaeumannomyces Patch). He has been using ammoniated sulfur and has had some success with treatment of 8 oz./1,000 sq. ft. of Thiram. On July 1, Ray Schmitz, Flossmoor CC was pleased with results from his Cutlass application.

On July 2, observed results of fairways at Edgewood Valley treated with turf-cal. Harold Frederickson reported that the fairways decreased from 50% to 5% Poa annua after Turf-Cal treatment. A new improved Turf-Cal formulation will be available late August.

Bob Kronn, La Grange CC is doing an outstanding job of tackling a new challenge. He will win.

In early July, I was really impressed with the condition of Olympic Fields fairways. Brian Chalifoux is a demonstrated professional superintendent.

Dave Ward, Ravisloe CC and Randy Wahler, Knollwood Club are testing a new numbered Crabgrass killer with Mallinckrodt research department. This industry will continue to grow as long as this close cooperation is prevalent.

Visited James John, Northmoor CC mid-July. Northmoor's beauty is the result of a hard working dedicated superintendent.

Bruce Williams, Bob O'Link GC tree and ornamental program is a program all of us could take a lesson in applied beauty.

Recently I visited Adolph Bertucci's new shop. It is a 60' by 246' building both attractive and functional. His office is more spacious with fine paneling than the mayor's office in downtown Chicago.

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