STOP #3

Core Cultivation Update

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Golf course greens and other turf areas are sometimes subjected to high levels of traffic often resulting in severe soil compaction. This causes limitations in aeration, rooting and water infiltration and makes the turf more susceptible to stresses. Core cultivation (also called aerification) is widely used to relieve these problems and others by: 1) improving water infiltration; 2) disrupting layers of soil and/or thatch near the surface, 3) improving wetting of hydrophobic soils, 4) encouraging thatch control when soil from the cores is returned, 5) providing an avenue for new root growth, 6) improving aeration and 7) serving as a useful tool in renovation and establishment.

Considerable interest has arisen regarding the use of solid tines on coring units on putting greens. Supporters of this practice feel a shattering of the soil occurs, thus the term shattercoring has been used. Because no soil cores have to be removed, reduced labor and less interference with play are suggested advantages compared to the standard practice. Opponents are concerned about the potential for causing greater compaction, particularly at the bottom of the coring hole.

The objective of our research is to evaluate the effectiveness of both hollow and solid tine coring. A field study was initiated in May 1984 to compare hollow and solid tine coring on putting green soil when cored at two moisture levels with two compaction levels. The study was performed on Penneagle creeping bentgrass maintained under golf green conditions and grown on a loamy sand soil.

Evaluations made included water infiltration rates, penetration resistance, saturated hydraulic conductivity and oxygen diffusion rates.

Infiltration data suggest all coring treatments reduce steady state infiltration rates. The degree to which these rates are reduced is largely influenced by soil moisture content at the time of coring, but no effects could be attributed to the type of tine used. All coring treatments reduced the amount of force required to penetrate the soil surface. Compaction treatment without coring resulted in lower hydraulic conductivities. Oxygen diffusion data shows a tendency for coring to reduce oxygen diffusion at the 2 inch depth. If soil compaction is occurring at the bottom of the coring hole lower diffusion rates would be expected; however, the observed reduction was probably not great enough to create oxygen stress on the turf.

Conclusions: Both hollow and solid tine coring appear to have a loosening effect on the soil surface, although data suggests the soil properties below the surface are being adversely affected. This would indicate that some compaction is occurring at the deeper end of the cultivation zone. The severity of this compactive effect may be enhanced when coring during wet soil moisture conditions, particularly with solid tines.

The use of solid tines will not likely replace hollow tine coring as a standard practice. Solid tine coring could be used experimentally during periods when hollow tine coring is considered unwise because of desiccation potential or interference with play. Solid tine coring with small tines would allow for a quick loosening and opening of the surface soil to increase infiltration and aeration into the coring holes, yet the holes close quickly since no soil or turf is removed.

Although still experimental, in our opinion, solid tine coring has potential as a supplemental operation to standard hollow tine coring. Further research and field use over a period of years will ultimately prove the long term value and/or detriment of solid tine coring.