

AERIFYING AND DETHATCHING KENTUCKY BLUEGRASS AND RED FESCUE TURFS

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Cultural practices such as aerification and dethatching are commonly used to alleviate maintenance problems associated with soil compaction and accumulation of excess thatch. Both practices can be used on a corrective or a preventive basis. On a preventive basis, aerification and dethatching are generally employed in conjunction with other cultural practices that are involved in annual maintenance programs.

AERIFICATION

Intensively trafficked turfgrass areas are exposed to wear and the subsequent reduction of turfgrass cover. As the cover is reduced, soil compaction is increased. This increased soil compaction destroys structure and results in:

- (a) increased soil density
- (b) decreased pore size and space
- (c) reduced infiltration and percolation rates
- (d) reduced oxygen diffusion rates
- (e) increased accumulation of CO₂ in the root zone

Compacted soils are subjected to greater heat exchange and greater temperature extremes. Soils can become so severely compacted that root growth is mechanically impaired. Bulk densities of 1.5g/cc or higher have been reported to seriously reduce root growth (1). Soil compaction increases with soil moisture until the soil reaches saturation. It decreases as thatch increases, and decreases as shoot density and plant height increase.

Soil compaction is greatest in the upper three to four inches of soil, and is most severe in the upper inch. Aerification and soil cultivation can be used to alleviate compaction and improve growing conditions. A number of soil cultivation practices have been developed for turf. These include: (a) coring, (b) spiking, (c) slicing, and (d) grooving. This discussion will be limited to the effects of coring on turfgrass soils where Kentucky bluegrass and red fescue comprise the turfgrass communities.

Coring involves removal of soil by tines or spoons, leaving holes or cavities in the turf. These cores range from 0.25 to 1.0 inch in diameter, and 1.0 to 6.0 inches in depth. Core removal is generally spaced on 2, 4, or 6 inch centers.

Coring units operate by two basic principles: (1) vertical motion with core spacing determined by the forward speed of the machine; and (2) tines or spoons mounted on a wheel or drum. Core spacing on the wheel or drum-type machine is determined by the number of tines. Vertical motion machines with closed tines are commonly used on golf course greens and tees. Drum or wheel-type units with spoons or tines are used on more extensive turfgrass areas such as parks, athletic fields, intramural and play grounds, fairways, and homelawns. New developments in drum-type coring units allow the soil cores to be caught in the inner portion of the drum and may be dumped by opening a gate located in the side or end of the drum. With other systems cores can be chopped and scattered on the surface or they can be removed by hand, depending on the extent of the turfgrass area and its intended use.

Coring on Kentucky bluegrass or red fescue turfs is best practiced in the spring and fall, when soil temperatures are conducive to active turfgrass root and shoot growth. This will allow turfgrass plants to recover from injury that may have occurred during aerification and to take optimum advantage of the improved soil conditions for turfgrass root growth. Root growth is stimulated in the open aerification hole due to improved oxygen, nutrient, and moisture penetration, as well as by reduced mechanical impairment. Within seven to ten days after aerification, holes will contain white, actively-growing turfgrass roots. These healthy, vigorously-growing roots lead to a deeper more extensive root system and plants that are better suited to withstand stress.

DETHATCHING

Excess thatch can be a problem, especially on intensively managed turfgrass areas. When thatch accumulates to 0.5 to 0.75 inch on a Kentucky bluegrass or red fescue turf, it can seriously impair oxygen, nutrient, and water penetration into soils. As excess thatch accumulates, turfgrass crowns tend to become elevated with roots and rhizomes growing mostly in the thatch layer. This leads to a shallow root system and plants that are more susceptible to drought, desiccation and winter injury. The thatch also provides a favorable environment for the development of certain turfgrass diseases and insects.

Preventive measures can be practiced to help avoid excessive thatch accumulation. Any cultural practice that stimulates plant growth also contributes to thatch build-up. Excessive nitrogen nutrition, frequent irrigation, infrequent mowing, increased mowing heights, and vigorous, actively-growing cultivars all contribute to increased thatch accumulation. Acid soils and poor soil aeration also contribute to thatch build-up. These factors should be taken into consideration when developing cultural programs, so that thatch accumulation can be kept to a minimum.

Thatch accumulations can be effectively reduced by topdressing, coring, and/or vertical mowing. Topdressing is most practically used on golf greens. Coring is effective when practiced on a frequent basis, and is best used in conjunction with topdressing. Vertical mowing is the most practical method of thatch removal for large turfgrass and home lawns. Excessive vertical mowing should be avoided. If thatch accumulations exceed 1.5 inches, two or more removal periods should be used to avoid excessive turfgrass injury and stand thinning.

Vertical mowing for thatch removal on Kentucky bluegrass and red fescue turfs is best practiced in the early spring or fall when soil temperatures are conducive for sufficient growth to recover areas that are thinned during the dethatching operation. At least thirty days of favorable growing conditions should follow the dethatching operation. Dethatching in the spring should be followed by the application of a preemergence herbicide to prevent crabgrass and goosegrass invasion.

Biological dethatching agents have been given a great deal of consideration recently. Data reported by several researchers in various climatic regions have not supported their effectiveness in reducing thatch under turfgrass growing conditions (2, 3, 4). Work in California at four locations found no significant reduction in thatch accumulation when Biodethatch, Thatch Away, and Earth Anew were compared (2). Biodethatch and Thatch Away were not effective in reducing

thatch accumulation in a common bermudagrass turf in Hawaii (4). Similarly in a study conducted at the University of Nebraska, biological dethatching materials did not significantly reduce thatch accumulation in a Windsor Kentucky bluegrass turf. However, thatch accumulation was significantly reduced by a combination of vertical mowing, aerification, and topdressing.

LITERATURE CITED

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