

CULTIVATION OF GENERAL TURFS

James A. Murphy and Paul E. Rieke
Crop and Soil Sciences

Alleviation of problems associated with soil compaction and excessive thatch development are two major objectives of cultivation on general use turf sites. The degree to which soil structure and thatch can be modified varies with the type of cultivation equipment used. Turf managers need to consider the size and spacing of tines on the available equipment. It is also important to consider the depth to which the tines will penetrate the soil.

Figure 1 shows the effect of several cultivators on soil strength. This data was collected from a Michigan State University intramural football field on September 19, 1986. Cultivation treatments were applied on September 5, 1986 using the Aer-Way, Toro, and Verti-Drain aerifiers. The Aer-Way unit created a triangular shaped slot in the soil, with a maximum penetration of approximately 4.5 inches. Tines were spaced 6 inches apart. The Toro aerator utilized 5/8 inch diameter hollow tines spaced 2.5 inches apart and achieved a maximum penetration of 3 inches. The Verti-Drain equipped with 3/4 inch diameter hollow and solid tines spaced 4 inches apart varied from 6 to 9 inches in soil depth penetration.

The Verti-Drain unit, equipped with hollow or solid tines, provided significant loosening to the 8 inch depth compared to other treatments. Hollow tines on the Verti-Drain resulted in a greater loosening of the soil compared to the solid tine treatment. The Toro aerator dramatically reduced soil strength in the surface 3 inches, but had little effect below the 3 inch depth. This illustrates the need to consider the depth of your soil compaction problem which, in turf, determines the type of cultivation equipment required for the job. The Verti-Drain provided deep soil penetration and loosening, whereas, the Toro unit loosened to only the 3 inch depth.

The Aer-Way unit affected soil strength the least among the aerifiers tested. The effectiveness of the Aer-Way unit illustrates the need to consider tine spacing on cultivation equipment. The greater loosening of the soil surface with the Toro unit is due the greater intensity of cultivation (closer tine spacing) compared to the Aer-Way. A unit such as the Aer-Way may require two or more passes to achieve significant soil loosening.

Cultivators which bring soil to the turf surface are proposed to help control the development of excessive thatch. Soil incorporation into the thatch through coring is suggested to improve conditions for the microbial activity responsible for the breakdown of thatch. Enhancing degradative processes would thereby reduce thatch accumulation.

A study was initiated in September, 1987 on a 6 year old Kentucky bluegrass turf at the Hancock Turfgrass Research Center located on the campus of Michigan State University to examine the effect of soil cultivation on thatch development. The equipment used in this study included the Coremaster, Toro, and Verti-Drain aerifiers. The Coremaster was adjusted to give 1 inch and full tine penetration into the soil. The Verti-Drain unit was used with solid and hollow tines. Treatments were applied once in the fall except for 2 treatments which utilized the Toro aerifier for a spring and fall cultivation and a spring, early summer and fall cultivation. We will be characterizing

the amount of thatch as well as the relative state of degradation of the thatch. Preliminary data from golf green studies suggested that plant organic matter levels actually increase in the soil modified thatch layer. One explanation for increased thatch organic matter levels may be that soil incorporation stimulates new growth of stolons/rhizomes and roots within the modified thatch layer. This research will be continuing.

Home lawn turfs which have a moderate problem with compaction or thatch can be aerified annually. If a more serious problem with thatch or compaction exists, aerification should be done 2 or 3 times per year. Heavily used turfs such as parks or athletic fields can be aerified up to 3 times per year. Use an aerifier which penetrates at least 2, preferably 3 or more inches. Make enough passes to leave holes every 2 to 3 inches. Time the aerification when the grass is actually growing for quick recovery of the turf.

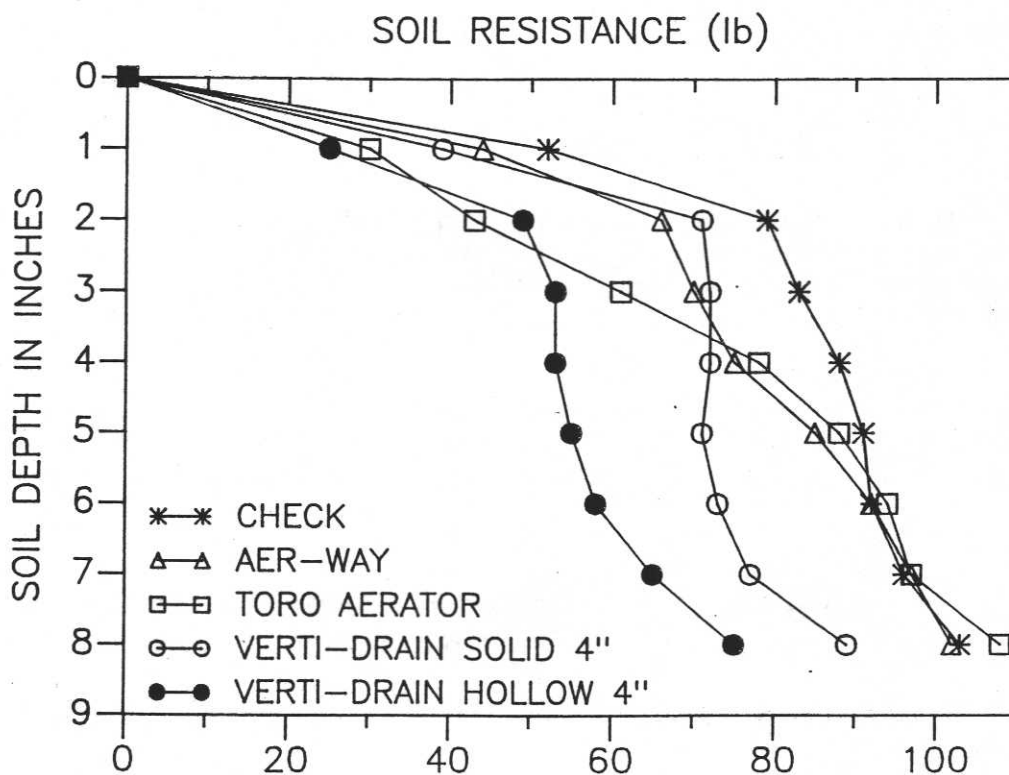


Figure 1. The change in soil strength due to various aerification treatments as measured with a soil penetrometer.