

UNIVERSITY OF GEORGIA

**Development of Cultivation Programs on Turfgrass to
Reduce Water Use and Improve Turf Quality**

1991 Research Grant: \$18,000
(Third year of support)

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Adverse soil physical conditions interfere with turfgrass management by limiting water movement, reducing plant water uptake, reducing soil aeration, and decreasing root/shoot growth. Compaction of the soil surface and excessively fine-textured (i.e., high in clay and silt content) soil profiles are two of the most common adverse soil physical properties. Cultivation is a primary means of alleviating these problems; however, comparative research studies to evaluate different techniques have not been conducted. The objectives of this project were: 1) to evaluate different cultivation techniques for their relative effectiveness in alleviating soil compaction, improving water use efficiency, and improving shoot/root growth; and 2) to develop "cultivation" programs for fairway/tee conditions based on using two or more different cultivation techniques.

Phase I (1989 to 1990) of this project focused on objective (1) and was summarized in the 1990 annual report; but new cultivation techniques will still be evaluated over the last two years (1991 to 1992). The primary focus in 1991 through 1992, however, will be to evaluate cultivation programs (i.e., objective 2). The soil is a Cecil sandy clay loam with 55.1% sand, 17.6% silt, 27.3% clay and 2.14% organic matter content. A common bermudagrass mowed at 0.75 to 1.0 inch was used.

Seven cultivation treatments plus two control treatments are under investigation in the 1991-1992 study. From the previous study in Phase I, the most effective cultivation technique was the Verti-Drain for deep soil improvement (see *Green Section Record* Vol. 30, No.1, pp. 5-9), while hollow tine coring improved surface conditions. Thus, intensity of Verti-Drain treatment (1x, 2x times over the plot area), as well as Verti-Drain plus hollow-tine coring combinations are being explored. The Yeager-Twose Turf Conditioner (a subaerification unit) has not been evaluated in research studies for comparative effectiveness as a turfgrass cultivation unit. The vibrating shank of this device goes to a depth of 7 inches and, with proper attachments, can inject granular components to this depth.

Considerable data has been collected and is under preparation and analysis related to soil physical and chemical properties by depth; water use and extraction patterns by depth; and root growth by soil depth. Shoot responses in 1991 revealed improved turf quality and shoot density from the Turf Conditioner + gypsum and Verti-Drain + core aeration treatments. Late summer shoot growth rate was enhanced by Turf Conditioner + gypsum and Verti-Drain cultivation. The fact that improvements in visual quality, shoot density, color and shoot growth rate occurred for the Turf Conditioner + gypsum treatment, but not Turf Conditioner alone, implies a significant response to gypsum. Gypsum has the potential to reduce aluminum root phytotoxicity on these low pH soils.