

UCRTRAC Accumulative Research Summary
Section E: Production of Quality Putting Greens
Project 2

Title: Maintaining Putting Green Soil Aeration and Leaching Capability During the Summer with a Toro HydroJect.

Objective: Study summer cultivation treatments on an in-use annual bluegrass/creeping bentgrass putting green to achieve the improvement of soil aeration, soil water infiltration and percolation, leaching of salts, and rooting. The cultivation treatments were applied from 18 July to 18 Nov. 1996 and from 19 May to 22 Sept. 1997. The treatments consisted of 1) No cultivation (check), 2) solid tine (0.25-inch diameter x 3.5-inch long) cultivation applied every 14 days, and 3 to 5) water injection cultivation applied every 21 days with a Toro HydroJect in the raised position, and applied either every 14 or 21 days with the same HydroJect unit.

Location: Dwight D. Eisenhower practice putting green located at Industry Hills Golf Courses.

Duration: Two seasons

Funding Source: The Toro Company
(Note: Considerable assistance from Bert Spivey, Kent Davidson, and their staff.)

Findings:

Field Infiltration Rates

- Under the conditions of this study, summer cultivation treatments, considered as a group, significantly increased the field infiltration rate compared to the check treatment during four of five test dates during the two seasons.
- The raised-position HydroJect treatment had the numerically highest field infiltration rates. This was most likely because this treatment created the widest-diameter surface entry into channels.

Soil EC_e

- Summer cultivation treatments, considered as a group, significantly decreased overall soil EC_e compared to the check treatment in the 1.0- to 3.0-inch and 3.0- to 6.0-inch root-zone depths, but not the 0- to 1.0-inch root-zone depth. All root-zone depths are reported as the distance from the soil-thatch line. The lack of salt leaching in the upper root-zone was most likely because of its higher organic matter content and cation exchange capacity.

Continued...

- Though the soil EC_e of this study site was relatively low, (mean soil EC_e for the 0- to 1.0-inch root-zone depth = 1.93 dS/m; mean soil EC_e for the 1.0- to 3.0-inch root-zone depth = 1.27 dS/m; mean soil EC_e for 3.0- to 6.0-inch root-zone depth = 0.99 dS/m), its reduction due to cultivation treatments could be biologically important for annual bluegrass maintained as a putting green and subjected to prolonged and/or severe high temperature and traffic stress during the summer.
- The overall leaching effect was only significant for the 1.0- to 3.0-inch root-zone depth. Leaching had a minimal effect most likely because of the relatively low salinity in the irrigation water (EC = 0.98 dS/m) and in the modified root-zone soil of the putting green.

Soil Total Porosity, Air-Filled Porosity, Bulk Density, Oxygen Diffusion Rate, and Root Mass Density

- Summer cultivation treatments did not significantly affect soil total porosity, air-filled porosity, and bulk density. This is not unexpected because cultivation treatments did not change the soil bulk volume due to the creation of channels. These characteristics will most likely require changes in soil texture.
- Summer cultivation treatments, considered as a group, tended to improve the overall oxygen diffusion rate compared to the check treatment at the depth of 0.4 inch below the soil-thatch line.
- Summer cultivation treatments, considered as a group, tended to improve the overall root mass density compared to the check treatment in the 3.0- to 6.0-inch root-zone depth.

Status: A two-season study was completed. Information associated with this study was presented at the UCR Turfgrass Research Conference and Field Day, at the American Society of Agronomy Meetings, and at a Toro Research Meeting. Information associated with this study was published in abstracts from the two former presentations and *in Better Turf Thru Agronomics*. A semitechnical paper is scheduled to be published in *Golf Course Management* in early summer 2000. A technical article was prepared and will be submitted to a scientific journal.

TORO HYDROJECT PLOT MAP

TREATMENTS

- A -- No Cultivation
- B -- HydroJect Lowered (21)
- C -- HydroJect Raised (21)
- D -- HydroJect Lowered (14)
- E -- Spiking Greens air.

