

POTENTIAL PHOSPHORUS MOBILITY IN SAND BASED PUTTING GREENS

E. D. Miltner and P. E. Rieke
Department of Crop and Soil Sciences

The potential for contamination of surface waters by phosphorus fertilizers is one of the areas of great concern facing the golf industry and agriculture as a whole. This topic takes on increased importance when construction of a new course in an environmentally sensitive area is proposed. Based on clay content, most soils have the capacity to adsorb a certain amount of phosphorus, limiting its downward vertical movement. Because of low clay content, the ability of a sand-based greens mix to exhibit such adsorption may be limited. Two experiments were initiated in 1991 to investigate the potential for vertical movement of fertilizer phosphorus in sand-based putting greens. Two plot areas on the HTRC putting green which have been maintained as phosphorus deficient for a number of years were used for these studies. For the first experiment, initial soil samples were taken in three inch depth increments to a total depth of 12 inches, then eight rates of fertilizer phosphorus were applied to 1.5 x 2 m plots. The first four rates of application were 0, 0.5, 1.0 and 2.0 lbs. P_2O_5 per 1000 sq.ft. Two additional rates were based on soil test results, one according to Bray-Kurtz P1 extractable P and the other based upon Olsen extractable P (two different soil extraction methods). The Bray-Kurtz method is routinely used by the MSU Soil Testing Lab. Olsen is the preferred method for soils with pH measurements in the range of 7.8 or higher. The rate of application for the first year according to both methods was 4.0 lbs./1000 sq. ft. The six treatments described above were made with surface applied P. The final two treatments were at the rates of 1.0 and 4.0 (soil test recommendation) lbs. P_2O_5 per 1000 sq. ft. using a prototype of the Hydroject aerifier to inject the fertilizer to a depth of 5 inches. Soil will be sampled on an annual basis as described above to assess the phosphorus status. The fertilization treatments based on soil test recommendations will be adjusted appropriately. Treatments will be re-applied yearly and the study will continue into 1994.

The second experiment is being conducted on an adjacent P-deficient area of the green constructed with Purr-Wick drainage. There are two separate regions of this plot which drain into separate collection basins. Phosphorus was applied to the two plots at the rates of 1.0 and 4.0 lbs. P_2O_5 per 1000 sq. ft. per year. Drainage water is collected periodically and analyzed for phosphorus content.

Phosphorus deficient plot areas were chosen for these experiments so that monitoring might encompass both the phosphorus adsorption and phosphorus saturated phases. Data from soil samples collected prior to initiation of the experiments and samples collected again in July 1992 will be discussed, as well as data concerning leachate from the Purr-Wick plots.