Phosphorus movement and uptake in Bermudagrass putting greens

by Elizabeth A. Guertal, Auburn University

Research at Auburn University was initiated to determine the effect of P rate and P placement on P uptake, extractable soil P, and turf performance in two hybrid Bermudagrass (cv TifEagle) putting greens. The study found:

- In both years of the study, Mehlich extractable soil test results indicate, according to those recommendations (P at 130 lb P_2O_5 $acre^{-1}$), additional P fertilizer was needed three to five months after the initial P application.
- Application of P in excess of recommendations (195 and 260 lb P_2O_5 $acre^{-1}$) didn't appear to be prone to downward movement (0-12 inch sampling) within the one-year evaluation.
- Shoot density, dry weight of roots (0- to 3-inch depth), clipping yield, and P uptake by Bermudagrass all increased as P rate increased, typically up to a P fertilization rate of 195 lb P2O5 $acre^{-1}$.
- The method of P application (band or broadcast) rarely affected extractable soil P, and the only agronomic factor that was affected was P uptake by Bermudagrass. In that case, Bermudagrass growing in plots which received banded P had greater uptake of P than Bermudagrass growing in pots with broadcast P.
- Phosphorus fertilization of sand-based greens shouldn't be neglected, and slightly higher rates (or more frequent application) than that recommended by current AL soil-test recommendations might be warranted. Additional research is needed in this area to make sure long-term environmental impacts via P accumulation don't develop.

The method of phosphorus application rarely affected extractable soil phosphorus.

Saturated hydraulic conductivity of coarse-textured, root-zone mixes

by She-Kong Chong, Anquan Zhang, Richard Boniak, Yanhe Huang, and C.-H. Ok, University of Southern Illinois

To be qualified as a USGA green, construction requires total porosity (P_t), air-filled porosity (P_a) and saturated hydraulic conductivity (K_{sat}) of the sand mix meet specific values. Reports indicate that K_{sat} of the same material measured by different technicians and laboratories resulted in large variations that limit the utility of the data. The objective of this study was to develop a procedure for measuring K_{sat} of coarse-textured rooting mixes.

A new permeameter was developed. The saturation tank and permeameter was combined into a single system, hence, the soil column could be kept submerged in water at all times to avoid air re-entry into the sample.

Soil-moisture-density curves of sand and sand mixes showed the optimum sand mix moisture content for packing the sample was between 0.06 and 0.07 g g^{-1}. Research also indicated if peat moss is used as an amendment, the application rate shouldn't be more than 0.02 g g^{-1} of sand.

When packing the soil column, the three-layer approach, as described in the Proctor's test, was adopted and modified for column construction.

Both K_{sat} and bulk density of soil columns constructed by one-, two-, and three-layer approaches were evaluated statistically. Results indicated that the two- and three-layer approaches could generate adequate firmness comparable to a severely compacted putting green and provide consistent and uniform soil columns for K_{sat} measurement. For practical purposes, the two-layer approach was suggested for soil column construction to save time and labor.

No differences were found in bulk density and K_{sat} between sand columns packed by 1.32- or 3.02-kg hammers. Because a larger soil sample (76 mm in diameter) was suggested for measuring K_{sat}, the 3.02-kg hammer should be used in packing soil columns.

The developed procedure was tested by laypersons using the same sand mix and the results showed only about 10 percent differences in K_{sat} compared to K_{sat} measured by technicians. GCN

The saturation tank and permeameter was combined into a single system.

For more research information, visit the U.S. Golf Association's Turfgrass and Environmental Research Online (http://usgatero.msu.edu).