

# Phosphorus Fertilization of USGA-Type Putting Greens: Placement, Rates and Leaching

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## Objectives:

1. Evaluate common soil-test P extractants for their ability to predict bermudagrass response to P fertilization and turfgrass quality in a native soil and USGA-type putting green.
2. Evaluate P sufficiency levels in bermudagrass putting greens via tissue testing.
3. Examine P fertilizer rates and their implications for downward movement of P in USGA-type and native soil bermudagrass putting greens.
4. Examine P uptake and turf health in USGA and native soil bermudagrass putting greens as a function of P placement.

**Start Date:** 2000

**Project Duration:** 3 years

**Total Funding:** \$34,218

Although it is the fertilizer nutrient needed in the third greatest quantity by turfgrass, research on phosphorus (P) fertilization is scant. Except for a few P runoff studies that were completed under fairway turf conditions, there is little information about P leaching, P uptake, or P fertilization requirements in USGA-type putting greens, especially during the critical grow-in period.

Additionally, alternative application methods such as deep placement via core aeration has never been explored, even though deep placement of P in no-till cropping systems has shown such placement to be an effective method for maximum P availability, crop uptake and use.

This study uses a variety of experimental methods to evaluate common soil-test extractants for their ability to predict bentgrass response to P fertilization and turfgrass quality. It also evaluates P sufficiency levels in bentgrass putting greens via tissue testing, the potential for P leaching, and plant uptake and turf health



Different rootzone mixes are evaluated for phosphorus fertilization requirements at Auburn University.

as a function of P placement. It evaluates phosphorus (P) fertilization and movement in USGA-type and native soil (loamy sand) putting greens. The experiment was conducted at two sites in Auburn, AL: the Auburn University Club (USGA-type green) and the Auburn University Turfgrass Research Unit (native soil).

Both sites were planted with hybrid bermudagrass ("Tifdwarf") and overseeded with *Poa trivialis* in the winter.

Phosphorus fertilizer was applied in April, 2000 (Auburn University Club) or July, 2000 (Auburn University Turfgrass Research Unit) at rates of 65, 130 and 260 lbs.  $P_2O_5$ /acre.

Fertilizer was applied by either broadcasting over the surface or banding via incorporation into core aeration holes. All plots were uniformly core-aerified and filled either with P fertilizer (band treatments) or sand (broadcast treatments). Collected data includes monthly soil-P using the Mehlich III soil-test extract (0-3 inch depth), monthly color and quality, twice yearly P movement (via incremental sampling) and twice-yearly rooting data.

Clipping yield is also collected each time a soil sample is taken, and a subsample of dried clippings will be analyzed for tissue P content. Calibration of additional soil



Dr. Beth Guertal, Auburn University, explains how phosphorus fertilization varies with the different amended sand rootzones.

extractants will also be explored, including resin extracts, Bray-1 extracts, and water-soluble phosphorus.

To date, six monthly samplings have been completed at the AU Club site, and three monthly samplings have been completed at the Turfgrass Research Unit site.

In the sand-based green at the Auburn University Club, soil-test P levels have dropped dramatically, and all plots (including the 2x rate) require additional P fertilizer. This was applied in September, 2000, immediately after the first P movement data was collected. At this time, neither the P movement data nor the exploration of various extractants has been completed.

## Summary Points

- In the sand-based green at the Auburn University Club, soil-test P levels have dropped dramatically, and all plots (including the 2x rate) require additional P fertilizer.