

# 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.

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**Project Duration:** 3 years

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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 growth period.

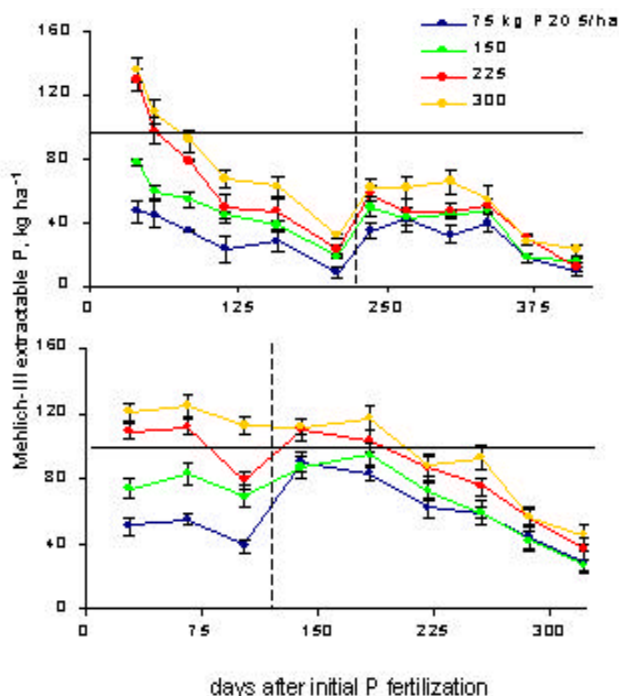
Additionally, alternative application methods such as deep placement via core aeri-

fication 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 bermudagrass response to P fertilization and turfgrass quality. It also evaluates P sufficiency levels in bermudagrass putting greens via tissue testing, the potential for P leaching, and plant uptake and turf health 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).

P fertilizer, and sweeping that applied P fertilizer into the core holes. Sand topdressing was applied following this banding procedure. Broadcast applications were created by core aerifying the green, applying sand topdressing, sweeping that sand into the core holes, and applying the P fertilizer across the top of the plots. P rate treatments were applied at 75, 150, 225 or 300 lb P<sub>2</sub>O<sub>5</sub> /A.

Collected data included monthly soil sampling (0-3 inches) for soil P analysis, and monthly clipping yield and P content. Extractants were water, exchangeable resin, Bray-2 and Mehlich III. Every six months the plots were deep sampled (0-12 in.), separated into 2-inch increments and analyzed for soil-P content. Six months after the first P rate application (immediately following the deep soil sampling) the plots were fertilized again.



Mehlich-III extractable P as affected by sampling time, Auburn University Club (top) and Auburn University Turfgrass Research Unit (bottom). Legend indicates P rates applied at the start of the experiment. After six (AU Club) and three (TGRU) months, additional P was applied according to AU soil-test recommendations.

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<sub>2</sub>O<sub>5</sub>/acre.

'Banded' P treatment was a vertical band of P created by first core aerifying the green (1 cm diam.), removing the cores, applying the

## Summary Points

□ Extractable soil P declined rapidly over time. After six months at the AU Club every treatment received additional P, and after three months at the Turfgrass Research Unit, the three lowest P rate treatments required additional P to meet soil-test recommendations.

□ Initial application of high rates of P usually did not compensate for rapid P loss. Frequent application would be needed to keep soil-test P at or above the critical level.

□ Method of application (band versus broadcast) sometimes affected soil-test P and P uptake. If method of application did affect P uptake, there was greater tissue P in bermudagrass grown in plots where P was banded.