

**EFFECTS OF REDUCED EARLY POST-SPRIGGING
NITROGEN APPLICATION
ON BERMUDAGRASS SPRIG ESTABLISHMENT**

By

Jon E. Zalewski

Committee Chairman: David R. Chalmers

Crop and Soil Environmental Sciences

(ABSTRACT)

Nitrate contamination of ground and surface waters is of serious concern in the United States. Since nitrate is considered one of the most widespread groundwater contaminants, research continues in many disciplines to identify and mediate possible sources (Petrovic, 1990). An opportunity to evaluate a possible source of nitrate contamination exists during bermudagrass sprig establishment. Since most “improved” bermudagrass varieties are established vegetatively, due to lack of viable seed, turf managers apply large quantities of soluble urea weekly to push growth. During this grow-in, turf managers typically apply 48.8 soluble kg N ha⁻¹ wk⁻¹ for an eight to ten week period. We hypothesize that the quantity of nitrogen applied is in excess and that similar 8 to 10 week grow-in can be achieved with less nitrogen especially during the first 4 weeks when there are few plants per unit area.

Three interrelated studies were conducted. A “field trial”, consists of 1.8 m² plots in 4 replications of 27 different nitrogen rates ranging from 4.9 kg N ha⁻¹ wk⁻¹ to 48.8 kg

$\text{N ha}^{-1} \text{ wk}^{-1}$. A lysimeter study quantified leaching nitrate loss using the same weekly nitrogen rates, however, only six treatments existed. All plots were rated at weeks 4, 8 and 10 for cover, color, and density. A greenhouse study was implemented to evaluate potential nitrogen use for a single bermudagrass sprig, during the early post-sprigging stage. In 1998 and 1999, it appears that typical weekly nitrogen rates of $48.8 \text{ kg N ha}^{-1}$ are in excess. Similar results were found using $48.8 \text{ kg N ha}^{-1}$ to $97.6 \text{ kg N ha}^{-1}$ over the first four week period and $195.2 \text{ kg N ha}^{-1}$ to $244.0 \text{ kg N ha}^{-1}$ during the entire grow-in. A 25 to 50 percent reduction in nitrogen application when compared to the typical $390.4 \text{ kg N ha}^{-1}$. Lysimeter results revealed large quantities of nitrate lost via leaching. The $390.4 \text{ kg N ha}^{-1}$ lost 34.7 and 44.6 percent of applied nitrogen in 1998 and 1999, respectively. Furthermore, similar turfgrass cover, color, and density were achieved using 80 percent less nitrogen during the grow-in period on sand-based media. The greenhouse study suggests that during the early post-sprigging period individual sprigs do not require large quantities of soluble nitrogen even on sand-based media. Results indicated that individual sprigs did not utilize $48.8 \text{ kg N ha}^{-1} \text{ wk}^{-1}$ during early post-sprigging. Similar results with respect to shoot weight, shoot length, and root weight were found using 40 percent less applied nitrogen. However, greater nitrogen rates may be necessary as plant density and root development increase later in the establishment period.