

**Tour Stop #2: Long Term Nutrient Fate Research**  
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The USGA initially funded research at Michigan State University to determine nitrogen fate and leaching from a Kentucky bluegrass turf in 1991. Similar to previous research, the initial research at MSU conducted from 1991 through 1993 indicated that there was minimal risk of nitrate-nitrogen leaching from Kentucky bluegrass (*Poa pratensis* L.) turfgrass. Since the summer of 1998 percolate samples have been collected from the same monolith lysimeters and analyzed for nitrate-nitrogen (NO<sub>3</sub>-N). As of 2010, the turfgrass area has now been under continual fertilization for 20 years with percolate collection for the last twelve years consecutively.

From July 1998 through 2002, lysimeters were treated annually with urea at a low N rate 2 lb. N/1000 ft.<sup>2</sup> (0.5 lb. N/1000 ft.<sup>2</sup>/application) and a high N rate of 5 lb. N/1000 ft.<sup>2</sup> (1 lb. N/1000 ft.<sup>2</sup>/application). From 1998-2002 for the high N rate there was a dramatic increase in NO<sub>3</sub>-N leaching from 5 mg L<sup>-1</sup> in 1998 to 25 mg L<sup>-1</sup> in 2002. During the same time frame there was a modest increase in NO<sub>3</sub>-N leaching from 3 mg L<sup>-1</sup> in 1998 to 5 mg L<sup>-1</sup> in 2002. In 2003 the N rate was reduced to 4 lb. N/1000 ft.<sup>2</sup>/year for the high N rate while the low N rate remained at 2 lb. N/1000 ft.<sup>2</sup>/year.

In 2003, the concentration of NO<sub>3</sub>-N leaching from the high N rate treatment did not decline from the previous years. The average NO<sub>3</sub>-N concentration leached from the low and high N rate treatments was 6.3 and 31.6 mg L<sup>-1</sup>. In 2004, the concentration of NO<sub>3</sub>-N leaching from the high N rate treatment declined drastically from previous years. The average concentration of NO<sub>3</sub>-N in leachate for the high N rate was 8.5 mg L<sup>-1</sup>. This was a decrease in NO<sub>3</sub>-N concentration of 23.1 mg L<sup>-1</sup> from 2003. For the low N rate the average concentration of NO<sub>3</sub>-N in leachate for the low N rate was 1.2 mg L<sup>-1</sup>. From 2004 through 2009 the mean NO<sub>3</sub>-N concentration for the low and high N rates was 2.6 and 7.9 mg L<sup>-1</sup>, this is a significant decline from the average concentrations observed for the high N rate from 2000 through 2003. Despite the overall decline in mean annual leaching concentrations from the high N rate, we have continued to record peak nitrogen leaching events during the dormant period from December through March.