



# Removing Nitrate and Phosphate in Drain Tile Leachate

*Adam Nichols and Erik Ervin, Ph.D.*  
Virginia Tech  
([adnichol@vt.edu](mailto:adnichol@vt.edu))

## Objective

Determine the efficacy of a combination of materials to selectively filter nitrate and phosphate from stimulated putting greens in laboratory and greenhouse experiments.

## Summary

Sand-based root zones are well suited for putting greens but have a low capacity for retaining nutrients and water. Frequent fertilization and irrigation are used during establishment to promote rapid turfgrass growth and development. This combination of factors, plus the tile drainage system beneath many putting greens, can lead to movement of nutrients into the surrounding watershed.

Nitrate and phosphate were the targets for removal from drain tile leachate and since both are negatively charged, materials that trap anions were used in the filters. Creeping bentgrass was grown in a sand-based root zone in plastic containers in a greenhouse. The turfgrass was fertilized and watered to simulate a grow-in and leachate was allowed to drain through the containers. Individual filters were

attached to half the containers and leachate was allowed to pass through the filter. All leachate, whether filtered or not, was analyzed for nitrate and phosphate content.

## Results

- In greenhouse studies, the filter greatly reduced the amount of nitrate and phosphate in leachate from simulated greens.
- The level of nitrate-nitrogen in filtered leachate was well below contaminant levels established by the U.S. EPA.
- The level of phosphate-phosphorus in filtered leachate was reduced by 94% compared to unfiltered leachate but remained above contaminant levels established by the EPA.



## Funded by



*Published in GCM, May 2010, pages 96 - 100.*