Title: **Downward Movement of Water Below Barnyard Grass Filter Strips - Case Studies (Study No. 36)**

Investigators:

Principal Investigator

Gary D. Bubenzer, Professor
University of Wisconsin-Madison
Dept. of Agricultural Engineering

Principal Investigator

James C. Converse, Professor
University of Wisconsin-Madison
Dept. of Agricultural Engineering

Research Specialist

John W. Patoch, Associate Research Specialist
University of Wisconsin-Madison
Dept. of Agricultural Engineering

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Objectives: To investigate the potential effects of grass filter strips on vadose or groundwater quality and examine current design standards for their adequacy in protecting groundwater from pollution due to water infiltrating into the soil in the filter area.

Background/Need: Wisconsin Administrative Code AG 165 requires counties to develop animal waste management plans and zoning ordinances which require control systems and storage facilities to meet Soil Conservation Service standards. Grass strips which filter barnyard effluent and encourage infiltration of the runoff water are generally considered an economic alternative for the control of potential barnyard pollutants.

Methods: Exploratory investigations of nutrient accumulation and movement below root zone of filter areas were made on 16 grass filter strips. At each site topographic surveys were made to locate soil sampling points and to identify areas of concentrated flow. Soil core samples were taken at grid points to provide uniform coverage over the filter area. Samples were dried and analyzed for total nitrogen, ammonia, nitrates, chlorides, and total phosphorus. Six filters were selected for further soil sampling and infiltration measurements based on preliminary explorations. Nutrient concentrations determined during the first phase of the study were compared with those from the background profiles to determine nutrient retention. Chloride was used to monitor water movement due to its conservative nature as a salt and water tracer. Nitrate- nitrogen, total nitrogen and phosphorus concentrations were used to indicate retention of nutrients within the profile.

Results/Conclusions: Changes in surface soils of the filter strips during the design and construction process altered the infiltration capacity, permeability and water holding capacity of the soil and need to be anticipated to insure adequate surface and subsurface drainage. Grass filters with good drainage were better maintained and appeared to have less potential for nutrient transport below the root zone. Findings of this study do not indicate serious pollutant movement deep into the soil profile, though there were indications of movement below the root zone.

Recommendations/ Implications: Proper management of the sediment basin and spreader will insure removal of solids before they enter the filter. Repair and avoidance of concentrated flow paths is suggested. Regular mowing and removal of grass will provide maximal recovery potential of nitrogen and phosphorus. Further study of use of the grass filter where the depth to groundwater or to a highly permeable strata is shallow and where cracking of the soil leads to rapid movement of the runoff water to a depth below the root zone is recommended.

Availability of Report: This report is available for viewing and loan at:

The Water Resources Center
1975 Willow Drive
Madison, WI 53706
(608) 262-3069
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