Subsurface Placement of Fertilizer Limits Nutrient Leaching

Agricultural tile drains in the Great Lakes region are one pathway by which nutrients enter waterways, contributing to eutrophication. Changes in how fertilizer is applied have been suggested as one way to reduce nutrient pollution, but how these alternative methods influence nutrient transport to tile drains is unclear.

In the current issue of *Vadose Zone Journal*, researchers conducted an experiment on intact soil monoliths to determine if and how different fertilizer application methods influenced nutrient leaching across non-growing season conditions. In their experiment, they examined linkages between hydrologic flowpaths and nutrient movement through both clay and silt loam soils under thawed and partially frozen conditions.

The team found that most of the infiltrating water travelled preferentially in clay soil under frozen and thawed conditions, and in silt loam soil under frozen soil conditions. Subsurface placement (banding) of fertilizer reduced losses of nitrate (23% in silt loam and 61% in clay) and dissolved reactive phosphorus (60% in silt loam and 64% in clay) compared with surface-broadcast applications. Subsurface placement was particularly effective in soil with preferential flow because fertilizer had limited contact with the preferential flowpaths.

Based on these findings, subsurface placement of fertilizer is recommended for reducing nutrient losses from agricultural lands. With limited resources, promotion of subsurface placement should target farms with soils prone to preferential flow (i.e., clay) where this practice is most effective.

Adapted from Grant, K.N., M.L. Macrae, F. Rezanezhad, and W.V. Lam. 2019. Nutrient leaching in soil affected by fertilizer application and frozen ground. *Vadose Zone J.* 18. View the full open access article online at http://dx.doi.org/doi:10.2136/vzj2018.08.0150

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