

Alternatives to Tile Risers for Managing Farmed Depressions

Douglas Smith

USDA-ARS National Soil Erosion Research Laboratory, West Lafayette, Indiana, USA
Douglas.R.Smith@ars.usda.gov

Closed depressions, also known as prairie pot-holes, are a common landscape feature in the glacial till landscape of the Midwestern United States. When these landscape features are farmed, they are typically drained using a tile riser. A tile riser is a pipe that extends above the soil surface with 2 to 4 cm holes in the side to drain ponded surface water. Recently, watershed scale research has found that greater density of farmed depressions results in greater phosphorus losses to streams (Smith et al., 2008). Many of these depressions are several kilometers away from the streams, and the tile risers provide no filtration of sediments or other contaminants. We developed a blind inlet to remove sediments and contaminants from water via filtration. Two adjacent farmed depressions (3.5 and 4.0 ha) have been located and instrumented in the St. Joseph River Watershed in Northeastern Indiana. The experimental design allowed for drainage to occur through either the tile riser or the blind inlet in each of the monitored depressions. Following storms, hydrology was continuously monitored, and water quality samples were collected for the duration of runoff events. In 2009, one of the depressions (West) had very little residue (~10%) and had a large amount of soil disturbance, while the other depression (East) had considerably greater residue cover (~90%) and no soil disturbance. The West depression was drained using the blind inlet, and the East depression was drained using the standard tile riser. Sediment loading from the West depression was 66% lower than what was predicted using the WEPP model. Soluble and total phosphorus loading from the West depression were decreased by 64 and 52%, respectively, compared to the East depression. An approved USDA-NRCS conservation practice in Indiana has been adapted to include the use of blind inlets to minimize sediment and phosphorus loading to streams. In 2010, a 300 ha monitored watershed is being used to test this practice at the catchment scale. In this watershed, there are 15 tile risers, all of which have been located and are being replaced with blind inlets. Preliminary results from watershed scale testing of this technology will also be presented.

Smith, D.R., S. J. Livingston, B.W. Zuercher, M. Larose, G.C. Heathman, and C. Huang. 2008. Nutrient losses from row crop agriculture in Indiana. *J. Soil Wat. Conserv.* 63:396-409.