Compact wetland has use for hog manure

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The wetland can remove phosphorus and nitrogen

Vertical-flow wetlands have been around for several years, but their introduction to livestock operations is new. Lloyd Rozema of Aqua Treatment Technologies in St. Catharines described the technology at the Integrated Solutions to Manure Management conference in London on Sept. 12.

"Because of the successes we've been having, we were approached by a local pig farmer (located south of St. Catharines) who was interested in a system," Rozema said.

Rozema said constructed wetlands first began to be used in the 1960s . These essentially mimic natural wetlands. They require a lot of land, may perform poorly in the winter in more northerly regions, and mosquitoes and odour may become a problem. Constructed wetlands do have a place despite their limitations, Rozema pointed out.

Subsurface horizontal-inflow systems were developed in Germany. There's no open water involved with these. A sand and gravel medium is used to anchor aquatic plants. Water flows horizontally through the medium. They work well in southern climates but are limited in their activity further north.

"During the winter when plants die as the oxygen going into the horizontal systems can be inhibited," Rozema said.

Vertical-flow systems, developed with U.S. government funding and support from the Great lakes Cleanup Fund, are similar to horizontal flow systems. The biggest difference is that water is moved vertically down through a gravel and sand medium.

In addition, vertical-flow systems can be accommodated in a relatively small area.

"Because of the good supply of oxygen, the treatment efficiency doesn't change much in winter," Rozema said.

The system being tested at the St. Catharines farm involves three lined cells filled with layers of sand and gravel. Cattails are planted into each of the cells. Currently, raw wastewater from the open lagoon is being pumped through the system and returned to the lagoon.

Eventually, water may be pumped from a new underground storage with the open lagoon being used to store treated water which might subsequently be used to irrigate a nearby hay field. The process removes a large percentage of the nitrogen and phosphorus content of the liquid manure. That's of benefit to a farmer who may have a limited land base.

The system can be modified to retain more nutrients, however. Sand with a low calcium level will result in less loss of phosphorus and a reduction in the water levels of the cells can reduce the nitrogen loss.

A 99 percent reduction in E.coli numbers was also noted. It's felt the high pH factor in the medium material is the likely reason.

The system costs about $20,000 to $25,000. IF phosphorus is to be removed, the sand medium may have to be replaced after a few years when it becomes saturated with the nutrient. The discarded sand could be used as a soil amendment, Rozema said.

The st. catharines system is still being assessed. There's a need to establish system size with the amount of manure being produced. Several other vertical-flow wetlands are being used in Ontario, but not to treat live-stock manure. The greenhouse operation Niagara Under Glass has a system and so do a number of Ontario Wineries.

Other wetland systems are used for purposes in agriculture production, usually as environmental buffers. Others catch and filter runoff before they enter watercourses, while still others are used to filter waste water from agricultural processes, such as hog manure after it has been treated by some sort of mechanical or chemical separation processes.