

USDA-CSREES 2007 National Water Quality Conference

Modeling Subsurface Lateral Movement of Water to Determine Nutrient Loads

In the Tri-county agricultural area (TCAA) that includes St. Johns, Putman and Flagler counties, agricultural production covers around 38,000 acres of which the majority is dedicated to potato production. The TCAA area is responsible for 65% of Florida's potato production. Most of the potato production area is irrigated using subsurface seepage furrow irrigation, taking advantage of the shallow hardpan by controlling the water table. Due to the nature of the system some subsurface lateral movement of water can be expected. This lateral movement can carry nutrients to the direction of the slope of the hardpan. This water movement can cause fertilizer applied to the field to wash towards the drainage ditches, and finally to the St. Johns River. Monitoring wells were installed in a 10 acre field, divided on intensive and extensive sampling areas. Tracer solution consisting of 30,000 ppm of bromide was injected in three wells in two equal injections prepared from standard potassium bromide. Water samples were collected weekly for 8 weeks. The preliminary Br data indicated that the subsurface water moved laterally towards north during the first week and then eventually moved southwest to the channel flowing out of the 10-acre study area into the farm outflow. At the end of 3rd week, the concentration of Br in one of the start wells was over 800 ppm indicating that the injection rates were sufficient to provide tracer resolution throughout the 6 week sampling period.

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