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**VEGETATED BUFFER'S EFFECTIVENESS ON
INNOVATIVE FERTILIZER AND BACTERIAL ATTENUATION**

Jon Schoonover*, Karl W.J. Williard, Billy Beck, Lee Doyle, Jonny Stewart

ABSTRACT: Vegetated buffers have been proven as effective nutrient and sediment filters from surface runoff in agricultural systems. However, vegetated buffers have had little attention focused on bacterial attenuation and uptake of innovative fertilizers such as slow release nitrogen. A three-year project was conducted to assess the impacts of vegetated buffers on surface water quality in southern Illinois, USA. In 2008, twelve 1 x 10 m flumes were installed in a row crop field on a 4 % slope adjacent to an ephemeral stream. In July 2008, three treatments of the following vegetation species were planted: giant cane (*Arundinaria gigantea* (Walt.) Muhl.), Kentucky Bluegrass (*Poa pratensis* L.), Orchardgrass (*Dactylis glomerata* L.), and a bare ground control. The following year three additional corn (*Zea mays* L.) plots were added for a total of 15 flumes. Over the course of a three year period water samples from the flumes were collected following cattle (*Bos taurus*) manure applications in 2009 and fertilizer additions in 2010 and 2011. Environmentally Smart Nitrogen (ESN, a slow release nitrogen fertilizer) and phosphorus fertilizers were added to an upslope corn plot that contributed runoff to the flumes. Water samples were analyzed for fecal coliform, *E. coli*, nitrate, ammonium, orthophosphate, and total phosphorus following rainfall simulations and natural rain events. Results indicated that the buffer vegetation had little influence on ammonium retention; however, the vegetated filter strips were effective at reducing nitrate concentrations following the ESN application. Unexpectedly, *E. coli* levels increased within the buffers during the summer months and were on average higher than the control and corn plots. Repeated manure applications combined with the microenvironment that the vegetated plots offered likely resulted in the elevated levels. Results from this study will help managers determine species to incorporate into new buffer designs as farming and fertilization practices continue to evolve.

* Associate Professor, Southern Illinois University Carbondale, 1205 Lincoln Drive, Carbondale, IL 62901-4411 USA,
Phone: 618-453-7468, Fax: 618-453-7475, Email: jschoon@siu.edu