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Session 3B: Sediments and Nutrients

Kentucky Water Resources Research Institute, University of Kentucky

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Starter Fertilizer Impacts on Turfgrass Establishment and Quality

James Cecconi[1], **Brad Lee[1]**, Suzette Walling[1], Gregg Munshaw[2], Dwayne Edwards[3]
[1]Department of Plant and Soil Sciences, University of Kentucky
[2]Mountain View Seeds, NE Salem, OR
[3]Department of Biological Systems Engineering, Virginia Tech. University
brad.lee@uky.edu

Home lawns are a significant contributor to surface water degradation due to nutrient runoff from fertilizers. Fertilizers high in phosphorus (P) are commonly used in lawn establishment, regardless of soil P levels. We determined the effects of starter P fertilizer on the establishment (coverage) and overall turfgrass quality on high P (Bluegrass; fine-silty, mixed, active, mesic Typic Paleudalf; Mehlich 3 (Meh3) extractable P = 430 lbs. ac^{-1}) and low P (Sadler; fine-silty, mixed, semiactive, mesic Oxyaquic Fraglossudalf; Meh3 P = 16 lbs. ac^{-1}) soils. Twelve pH adjusted soil box-plots, 6 with Bluegrass and 6 with Sadler, were seeded with tall fescue (*Festuca arundinacea* Schreb.) at a rate of 7 lbs. 1000 ft^{-2}. Three box-plots of each soil were fertilized using a commercially available starter fertilizer (24-25-4) according to manufacturer recommendations (3 lbs. per 1000 ft^2) . Box-plot images were collected weekly using a light box and images were evaluated for percent cover and turf quality using software (Turf Analyzer). There was no significant difference in percent cover between the two treatments (starter P versus no starter P) on the same soil from weeks 3 through 8 after seeding. Bluegrass with starter fertilizer box-plots had significantly greater overall turfgrass quality than Bluegrass without starter box-plots in week 8, but by the end of the experiment, week 11, there was no significant difference in overall quality between the two treatments. Starter fertilizer did not increase turfgrass cover nor improve overall quality on naturally high or low P soils under the controlled conditions used in this experiment.

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Blue Water Farms: Edge-of-Field Monitoring of Nutrient and Sediment Loss from No-Till Corn and Soybean Fields in the Lower Green River Watershed

Mark Akland[1], E. Glynn Beck[2], Jason Unrine[3], Erin Haramoto[3], John H. Grove[4], Brad Lee[3]
[1]Department of Plant & Soil Sciences, University of Kentucky, Henderson
[2]Kentucky Geological Survey, University of Kentucky, Henderson KY
[3]Department of Plant & Soil Sciences, University of Kentucky, Lexington KY
[4]Department of Plant & Soil Sciences, University of Kentucky, Princeton KY
markakland@uky.edu

Nutrient (nitrogen and phosphorus) and sediment derived from urban construction as well as food production activities are leading contaminants resulting in stream and river impairment in Kentucky. While agricultural producers commonly employ best management practices (e.g., crop rotation, cover crops, no-till, etc.) to mitigate nutrient and sediment losses to retain nutrients in-field, studies evaluating the efficacy of best management practices on the reduction of nutrient and sediment in agricultural runoff are limited in western Kentucky. To further understand the relationships between agronomic practices and water quality, researchers from the University of Kentucky have collaborated with the U.S. Department of Agriculture Natural Resources Conservation Service, Kentucky Soybean Promotion Board, Kentucky Agriculture Development Board, and Kentucky row-crop producers to conduct edge-of-field water quality monitoring in the lower Green River watershed. This project is part of a national effort to evaluate the efficacy of best management practices and assist the agricultural community in making informed nutrient management decisions.

Watershed analysis was conducted in the lower Green River watershed to identify 10 watersheds within no-till corn/soybean rotation fields. LIDAR and survey data were used to subdivide the fields into 5 control watersheds and 5 treatment watersheds ranging in size from 3 to 12 acres. In each watershed, a monitoring station was instrumented with a flume, ultrasonic flow sensor, flow meter, rain gauges (manual and tipping bucket) and a composite water sampler.

Year-round sampling of surface water runoff from no-till corn/soybean fields to monitor changes in nutrient and sediment loads is in progress. Data will be collected over a 10-year period, including 2 years of baseline data (calibration period) and 8 years of control/treatment data. In 6 paired watersheds, the control (current agricultural practice) is broadcast poultry litter and the treatment (best management practice) is poultry litter incorporation. In 4 paired watersheds, the control watersheds will be planted with a wheat cover crop, while the treatment watersheds will be planted with a cereal rye cover crop after the calibration period.

The results of this project are expected to help agricultural producers implement best management practices that reduce erosion and improve on-farm nutrient retention in Kentucky. Monitoring data are also expected to be utilized for modeling nutrient and sediment losses under differing farm management practices. If effective best management practices are implemented on a larger scale, this project may guide efforts to mitigate sediment pollution and downstream eutrophication (e.g., the Northern Gulf of Mexico Hypoxic Zone).

Blue Water Farms: Edge-of-Field Monitoring of Nutrient and Sediment Loss from Wetland Watersheds in the Northern Mississippi Embayment

Leighia Eggett[1], E. Glynn Beck[2], Jason Unrine[3], and Brad Lee[3]
[1]Department of Plant & Soil Sciences, University of Kentucky, Mayfield KY
[2]Kentucky Geological Survey, University of Kentucky, Henderson KY
[3]Department of Plant & Soil Sciences, University of Kentucky, Lexington KY
leighia.eggett@uky.edu

Wetland conservation easements are promoted by the U.S. Department of Agriculture Natural Resource Conservation Service to return floodplains and other flood-prone, row-crop agricultural fields to natural vegetation to filter nutrients and sediments in surface water runoff prior to reaching a stream or river. We propose to evaluate the soil phosphorus content of established wetlands of different ages. We hypothesize that nutrient stratification common in agricultural fields will be less prominent in older wetlands relative to younger wetlands. Seven small watersheds, less than 12 acres, within different aged, western Kentucky wetlands were selected: three watersheds less than 1 year old, two watersheds between 5 and 10 years old, and two watersheds between 30 and 40 years old. Soils were sampled with a pneumatic probe or hand auger on a 10x10 m grid at three depth intervals: 0-10 cm, 10-30 cm, 30-60 cm. Total phosphorus (microwave digest) and plant available phosphorus (Mehlich 3 extraction) were determined on each sample and spatial analyses was conducted using ArcMap. Results will be discussed spatially within each watershed with depth and temporally across all wetlands.