# Mills Scholarship Application

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Organic amendments can enhance soil and water conservation during turfgrass establishment and maintenance on agricultural and urban landscapes. Municipal sources of organic amendments, including composted municipal biosolids (CMB), can be applied to increase soil organic matter, improve water and nutrient retention, and enhance turfgrass establishment, growth and quality (McCoy 1998). For plant establishment on urban landscapes, the CMB is incorporated directly into the soil or topdressed. For example, the City of Austin offers a rebate incentive encouraging home-owners to incorporate 25% by volume of CMB to a 15-cm soil depth or to topdress a 0.6-cm depth. Yet, both soil and CMB can be susceptible to erosion in storm runoff during early establishment of grasses or ground cover. In addition, large volume-based CMB rates can increase soil nutrient concentrations and loss in storm runoff before vegetation is established. An alternative to amendment of urban soils is cycling of CMB through turfgrass sod grown and harvested on flat agricultural land near cities. The CMB removed in harvested sod is cycled back to the urban landscape through transplanted sod. The CMB residues applied during production increase nutrient concentrations in transplanted sod. But, the dense mat of turf plants in sod enhances water conservation and limits runoff loss of sediment and nutrients compared to new plantings of seed or sprigs in soil mixed or topdressed with CMB. In addition, no inorganic P or K fertilizer is required for CMB-grown sod, which could limit soluble N and P losses through runoff or leaching on constructed urban soils (City of Austin, 2005). Despite the potential benefits of cycling CMB through sod, the N and P imported with CMB-grown sod are a potential nonpoint source of nutrients that could affect urban water quality. The tradeoffs between benefits and negative environmental impacts of cycling CMB through sod need to be evaluated.

**Objectives:** 1.) Compare turf responses and water and nutrient conservation and losses among contrasting establishment methods, including turf planted as sprigs or sod, with and without CMB amendments. 2.) Relate soil bulk density and organic carbon concentration to soil water content for contrasting methods of CMB application and turf establishment over six rain events. 3.) Relate extractable N and P concentrations in the amended soil layer of establishment treatments to total and dissolved concentrations of N and P in surface runoff over six rain events.

**Methods:** Three replications of seven turf establishment treatments will comprise a randomized block design. For two treatments, Tifway bermudagrass will be established through sprigging in

soil with and without incorporation of CMB similar to current practices on urban landscapes. Four treatments will use transplanted sod. Tifway sod will be transplanted from turf grown with or without CMB. In addition, the sod with or without CMB will be transplanted on soil with and without incorporation of CMB. The CMB will be incorporated to make up 25% by volume of soil amended to grow sod or to establish turf through planting of sprigs or imported sod on runoff plots. The plots established through sprigging or transplanting of sod will be compared to a control of bermudagrass sod fertilized with inorganic N only before transplanting. The plots will be installed on an 8.5% slope excavated from a Boonville fine sandy loam soil. Sheet metal borders will isolate plots (1.5 x 4 m) and channel runoff through H-flumes into 311-L tanks.

Soil, CMB and sod components will be sampled and analyzed to quantify concentrations and amounts of N and P forms and organic C applied and recovered in the amended soil layer. Soil will be sampled to a 5-cm depth before and after runoff monitoring for analysis of nutrients and physical properties. Soil bulk density and water content will be determined gravimetrically. In addition, dielectric aquameter sensors and a data logger will be used to monitor soil water content within the amended soil layer of establishment treatments. Runoff will be measured and sampled after each of six natural rain events during turf establishment. Turfgrass will be mowed to a 7.5-cm height and clippings will be weighed and sub-sampled for analysis.

**Professional activities:**

Abstract:

Schnell, R., D. Vietor, R. White, and C. Munster. Effects of Composted Municipal Biosolids and Nitrogen on Turfgrass Establishment. ASA-CSSA-SSSA International Annual Meetings (November 12-16, 2006).

Proposals:

Schnell, R., D. Vietor, and R. White. 2006. Managing Water Quantity and Quality in Turfgrass Amended with Composted Municipal Biosolids. TWRI Graduate Research Grants Program. Not funded.

Schnell, R., and D. Vietor. 2006. Management of Nitrogen and Composted Biosolids to Cycle Nutrients and Enhance Environmental Quality During Production and After Transplanting Turfgrass Sod. USDA SARE Graduate Student Research Grants Program, Southern Region. Pending.

The scholarship funds will be used to support graduate tuition ($500) and travel to present a poster at the annual meeting of the Crop Science Society of America and American Society of Agronomy in Indianapolis ($1000). Travel expenses include meeting registration and transportation and lodging. Funds will pay a portion of tuition expenses during fall semester 2006.

I expect to complete my M.S. in Agronomy after the fall semester, 2006. The course work for my M.S. degree is focused in the area of soil fertility and my research explores methods of nutrient and carbon cycling that enhances soil and water conservation and protects water quality. Following completion of my M.S. degree, I intend to pursue a doctoral degree in Agronomy at Texas A&M University and continue research emphasizing nutrient cycling and environmental quality across agricultural and urban landscapes.