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Engaging Citizens to Urban Nutrient Planning of Lawns within a Nutrient Sensitive Watershed

Steven G. Hefner
Team Leader
South Missouri Water Quality Project
USDA-Natural Resources Conservation Service
Ozark, Missouri
steven.hefner@mo.usda.gov

Clay Robertson
Resource Conservationist
South Missouri Water Quality Project
USDA-Natural Resources Conservation Service
Ozark, Missouri
clay.robertson@mo.usda.gov

Adam Coulter
Urban Conservationist
South Missouri Water Quality Project
USDA-Natural Resources Conservation Service
Ozark, Missouri
adam.coulter@mo.usda.gov

Gene Stevens
Extension Associate Professor
Division of Plant Science
University of Missouri-Delta Center
Portageville, Missouri
stevensw@missouri.edu

Abstract: Simple and concise urban lawn nutrient management plans can be successfully implemented to combat eutrophication of lakes and streams. Soil test values from 540 lawns near Springfield, Missouri found that 51% of the samples tested above optimum levels for available phosphorus, especially where lawns were more than 20 years old. Urban nutrient management plans that contain the type, quantity, and timing of soil amendments assist homeowners in the selection of appropriate fertilizer choices from local retailers. Watershed stakeholders will adopt urban lawn nutrient management practices if Extension programs make a clear link between nutrient management and water quality.

Introduction

A healthy, green lawn adds curb-appeal to a house and increases the value of the property. Horticulture Extension agents in the three largest cities in Missouri (St. Louis, Kansas City, and Springfield) reported that 15-20% of their time is spent answering lawn questions, particularly lawn fertilization questions. Collectively, the degree of nutrient management in residential settings can have an impact on eutrophication of water resources. Waschbusch, Selbig, and Bannerman (1999) found that streets and lawns are the largest contributors of suspended sediment, total phosphorus, and dissolved phosphorus in a residential urban basin. Jemison, Wilson, and Graham (2004) incorporated lawn care into Maine watershed stewardship programs to protect lake water quality. In Wisconsin, Kussow (2004) reported that well-maintained lawns might have phosphorus losses that are 86 to 91% lower than poorly maintained lawns.

Local discussions have demonstrated to us that many citizens have difficulty with the term "nutrient management." This article discusses an approach to engage and educate citizens to practice judicious lawn nutrient management in a nutrient sensitive watershed.

Collaborative Efforts Address Nutrients

Springfield is the third largest city in Missouri, with a population of approximately 150,000 residents. Nestled in the Ozark Mountains, the area has a population of 390,000 when eight peripheral communities are combined with Springfield. Significant drainage from this area enters Table Rock Lake. Although Springfield was historically noted for exceptional water quality, elevated phosphorus levels stimulated algal blooms in the 1990's. Local residents began to pressure officials to increase regulation, and in 2001, the James River Basin became the first watershed in the state of Missouri to develop a Total Maximum Daily Load.

Over the past 6 years, the James River Basin Partnership and the Greene County Soil and Water Conservation District have been successful in securing grants to help educate and decrease nutrient loading in the James River Basin. With approximately 60% of the metro population residing within this basin, lawn care was identified as one of many resource concerns. The organizations decided to team with the Natural Resources Conservation Service and University of Missouri Extension to prepare urban nutrient management plans for lawns.

Approach

Our efforts were designed to target homeowners who practice self-service lawn care. Water quality grants provided funding to reimburse each homeowner for the cost of the soil analysis through a rebate program. Homeowners were required to pay for the initial cost of soil tests. A nutrient specialist then presented a rebate coupon following the development of a lawn nutrient plan. Coupons could be redeemed from an account established at a local bank.

Obstacles Facing Homeowners

Before the program, public interaction revealed a lapse in urban nutrient management frequently occurred when homeowners decided how many, what size, and what type of fertilizer bags to purchase. Some homeowners indicated it was difficult to make a sound fertilizer choice because of too many options (blends and bag sizes) available at stores. Further, most homeowners did not have accurate measurements of coverage area, a key component to translate a nutrient recommendation into the proper amount to purchase. To address this issue, a trained technician scheduled on-site visits to inventory homeowner's objectives and

existing lawn conditions and then incorporated information gathered from local fertilizer inventories into the nutrient plans.

Fertilizer Shopping List

A computer spreadsheet was designed to produce simple and concise urban nutrient conservation plans for homeowners. Conservation plans contained the type of amendments, the number of bags, and an application calendar for homeowners to follow. Participants compared the plan to a "shopping list" to assist them when purchasing items from a local retailer. The second component of the plan provided a spreader calibration procedure where a quantity of fertilizer was computed for a 500 ft^2 plot for each application period. Following plan development, the technician scheduled a visit with the homeowner for a short consultation.

Results

From 2002-2008, over 600 homeowners participated in the lawn nutrient program. The opinions of participants, collected through post-evaluation surveys, indicated the most important reasons for program participation were linked to "lawn enhancement through science-based recommendations" and "having a written conservation plan" (Table 1). Engaging and educating residents about urban nutrient management was our goal. Consultation sessions provided the opportunity to cover specific details of the conservation plan and to educate homeowners about nutrients and watershed health. The majority of participants (79%) not only reported an increased awareness of nutrient management but an increased awareness of how other resource concerns like stormwater, septic tanks, erosion, and riparian management affect water quality. The acceptance of the program has led to continued planning activities beyond the life of the grants.

Table 1.
Post-Evaluation Survey Responses of Participants Rating Different Aspects of the Lawn Nutrient Program

Reasons for Adopting a Lawn Nutrient Management Plan	**Importance Rating of Participants (% of respondents surveyed)**			
	None	**Low**	**Medium**	**High**
Environmental concern for the watershed	5	3	32	55
Opportunity to enhance lawn appearance by following science based recommendations	0	0	18	79
Having a nutrient specialist check existing conditions in the lawn	0	3	29	63
Having a nutrient specialist measure the coverage area and collect soil samples	3	5	21	68
Having a written conservation plan that details the type, amount, and application timing of materials	0	0	16	82
Having a recommendation that permits using all of the contents of the bag during an application (thereby avoiding storage)	8	13	37	39

Opportunity of saving money by correctly applying the materials myself	3	0	18	76
Qualifying for the reimbursement of the soil test costs through a rebate	13	11	32	42

Post-evaluation surveys revealed only 21% of participants had a current soil test, yet 90% reported using fertilizer prior to program participation. We found that the age of the lawn significantly affected several parameters, including soil test pHs, phosphorus, potassium, and organic levels (Table 2). Many participants (47%) applied "balanced" fertilizers that contained equal amounts of nitrogen, phosphorus, and potassium (e.g. 13-13-13). Thus, it is not surprising, given the popularity of balanced fertilizers and the reluctance to soil testing, that many lawns tested above 40 lbs P acre^{-1} (51%) and 220 lbs K acre^{-1} (82%).

Table 2.
Average Soil Test Values from 540 Lawns in 2002-2008

Lawn Grouping		**pH_s†**	**Phosphorus lb P acre^{-1}**	**Potassium lb K acre^{-1}**	**Organic Matter %**
Past history of fertilizer	No	6.1 b‡	45 a	313 a	3.7 a
	Yes	6.4 a	65 b	333 a	3.8 a
Age of Lawn	New	6.6 a	42 c	302 b	2.9 b
	5 - 20 yrs	6.3 b	60 b	332 a	3.9 ab
	> 20 yrs	6.1 c	65 a	329 a	4.2 a

† Soil test measurements were salt pH (measure in 0.01N $CaCl_2$ solution), Bray-1 extracted P, ammonium acetate extracted potassium, and combustible organic matter.
‡Within a lawn grouping, soil test laboratory values followed by the same letter were not significantly different at an -level of 0.05.

Conclusions

Our objective was to educate and engage urban homeowners on ways they can help minimize nutrients, especially phosphorus, from reaching Ozark streams and lakes. We found that a simple, concise lawn nutrient management plan that contains the type, quantity, and timing of soil amendments is an effective education tool. Professionals can help homeowners better manage nutrients on their lawns by knowing what types of fertilizer are available in local stores and fine-tuning soil recommendations to include a shopping list. We were encouraged to learn that those who had never tested soils prior to the program were now purchasing the specified type and amount (68%) of fertilizer suggested in the nutrient plan.

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