Ecological Turf Tips...

To Protect The Chesapeake Bay

Characterization of Turfgrass Nutrient Management Practices in Virginia

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The Survey

The Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, provided a grant to Virginia Cooperative Extension to determine the nutrient management practices of Virginia turfgrass professionals. In May of 1991 a survey was sent to 2,322 professional turfgrass managers in the Commonwealth of Virginia. The mailing list was generated from the Virginia Cooperative Extension turfgrass educational list consisting of individuals who have expressed an interest in receiving information about Virginia Tech's turfgrass educational programs. Three hundred and fifty-six surveys were returned and three hundred were deemed usable. Surveys filled out by product suppliers, retired professionals and homeowners were discarded. Surveys were returned from 60 of the 95 counties in Virginia with 14 percent of the respondents from Fairfax County. Thirty-eight percent of the respondents were from the counties of Fairfax, Henrico, Albemarle, Roanoke and Chesterfield, and the cities of Richmond and Virginia Beach.

Respondent Characterization

Of the respondents, 75 worked in lawn service, 69 in grounds management, 54 in golf course management, 45 in athletic field management, 18 in landscaping firms, 9 in highway management, 9 in sod production and 21 in other categories. Thirty-five percent of the respondents had been in their current position less than 5 years, with 11 percent in their current position for more than 20 years. The majority of the respondents (51%) indicated they were in supervision or management and 37 percent indicated they actually performed the maintenance work. When respondents were asked what their professional and educational background in this field was, 28 percent indicated "on the job training," 1 percent high school, 13 percent some college, 23 percent a four-year degree, 12 percent masters degree, 1 percent Ph.D. and 22 percent continuing education seminars, workshops and conferences.

Survey participants indicated they were responsible for maintaining a total of 69,876 acres of turfgrass in Virginia. Golf course responses represented management on 268 acres of greens, 262 acres of tees, 3,378 acres of fairways and 5,324 acres of roughs. Acreage of other areas represented were: lawns 24,494, highways 15,191, general turf areas 11,250, sod farms 5,114 and athletic fields 4,395.

Types of Fertilizer Used

Urea and ammonium nitrate were the most popular water soluble sources of nitrogen with 41 percent of the respondents using the individual materials or combinations of the two as their primary water soluble nitrogen source. Sulfur coated urea (SCU) products were the most popular source of slow-release nitrogen with 18 percent of the respondents indicating that it was their only source of slow-release nitrogen. One-third of the respondents were utilizing either SCU or urea formaldehyde (UF) or UF based products or, combinations of the two as their primary source of slow release nitrogen. Six percent of the professionals used natural organics as their exclusive slow-release nitrogen source and 25 percent used them in conjunction with other slow release sources.

Of the total nitrogen fertilizer used, 35 percent of the respondents indicated they use 10 percent or less of

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totally water-soluble nitrogen materials. Thirty-five percent of the respondents indicated 1 percent or less of the fertilizer they use is slow-release nitrogen. Twenty-two percent of the respondents indicated that 75 percent or more of the fertilizer applied was from water soluble sources. Twenty-one percent indicated that 75 percent or more of the fertilizer used was from slow release sources. Twenty-five percent of the professionals indicated they never used slow release fertilizers and 22 percent never used water soluble fertilizers.

Nitrogen Application Rates

The majority (54%) of the respondents never apply more than 1 lb of water soluble nitrogen per 1,000 square feet (lb/N/M) at any one time. A surprising amount of professionals (20%) do apply more than 1.5 lb water soluble N/M in single applications. Only 8 percent of the professionals apply more than 2 lbs of water soluble N/M in a single application. Eighty-three percent of the respondents never apply more than 2 lbs of slow-release N/M in a single application. The majority (61%) of the slow release nitrogen is applied at rates between 0.5 and 1.5 lb N/M. Only 9 percent of the slow release nitrogen is applied at rates greater than 2 lb N/M at any one time. The survey question about nitrogen application rates was general and did not discern between establishment and maintenance applications.

Methods of Application

Granular application of fertilizer is most popular, with 78 percent of professionals applying granular nitrogen greater than 90 percent of the time. Granular fertilization is the only method used by 56 percent of the respondents. Liquid fertilization was utilized less than 30 percent of the time by 88 percent of the respondents. Fifty-seven percent of the respondents indicated they never use liquid fertilization.

Nitrogen Timing on Cool-Season Grasses

In Virginia it is recommended that the majority of nitrogen be applied in the fall of the year with only light fertilization in the spring. The survey indicates that 56 percent of the respondents apply nitrogen to cool season grasses from September through December. Thirty-two percent of this group applies additional nitrogen in March, and 30 percent applies additional nitrogen in May. October was the most popular month for fertilization with 77 percent of respondents indicating they fertilize in October. April and May are the most popular months for spring fertilization with 70 percent indicating they fertilized in these months. With regard to the concern about nitrogen leaching in extremely cold weather, the survey indicated that 10 and 16 percent applied nitrogen in January and February, respectively. Nitrate leaching is potentially high in July and August when the cool-season turfgrass root systems are reduced in number. Relatively few respondents fertilize in the months of July (17%) and August (9%). This suggests that respondents surveyed provided little potential for significant nitrogen leaching from applications made in these two critical time frames.

Annual Rates of Nitrogen Application to Cool-Season Grasses

At the time this survey was conducted, recommended rates of nitrogen fertilization for cool-season turfgrasses in lawns ranged from 1 to 5 lb N/M, depending upon the level of quality desired and the type of nitrogen applied. The majority of the respondents (87%) were applying less than 5.1 lbs N/M, with 49 percent applying 3 lbs N/M or less and 9 percent applying 1 lb N/M or less. Twelve percent of the respondents indicated they apply more than 5 lb N/M/year.

Lawns

Total annual rate of applied nitrogen for lawn service respondents was as follows: Less than 1 lb N/M/year - 8 percent; 1.0 lb to 3.0 lbs N/M/year - 37 percent; 3.1 to 5.0 lbs N/M/year - 44 percent and 5.1 to 7.0 lbs N/M/year - 9 percent.

Golf Courses

Forty percent of golf course superintendents were fertilizing greens with 3.1 to 5 lbs N/M/year, while 24 percent were applying 5.1 to 7 lbs N/M/year and 18 percent were applying more than this. Most tees (48%) are receiving 3.1 to 5 lbs N/M with 31 percent receiving 1 to 3 lbs N/M/year. The majority (88%) of superintendents were providing 1 to 5 lbs N/M/ year to fairways with 52 percent providing 1 to 3 lbs N/M/year and 5 percent applying less than 1 lb N/M/year. Roughs were fertilized at less than 3 lbs N/M/year by 75 percent of the respondents with 21 percent applying less than 1 lb N/M/year.

Other Areas

Most highway respondents (73%) indicated that areas they fertilize receive 1 to 3 lbs N/M/year, with 18 percent indicating they provide less than 1 lb N/M/year to areas they fertilize.

In the cases of sod production and athletic fields, 40 percent and 35 percent of the fertilization, respectively, provided between 1 and 3 lbs N/M/year. Ten percent of both sod farmers and athletic field managers apply more than 5 lbs N/M/year.

General turf area fertilization included cemeteries, parks, recreational areas, median strips, campus grounds, etc. Most respondents (83%) indicated they provide 1 to 5 lbs N/M/year with only 3 percent providing more and 11 percent providing less. The largest group from general turf (52%) provided 1 to 3 lbs N/M/year.

Nitrogen Timing on Warm-Season Grasses

It is generally recommended that warm-season grasses be fertilized between April and July in Virginia. However, it is realized that in southeastern Virginia where extended growing seasons exist and perennial ryegrass overseeding is practiced, late season fertilization is practiced. A minority (27%) of respondents fertilize only between April and July. The majority (61%) apply nitrogen to Bermudagrass between April and August, with an additional 20 percent making applications in September and a small amount (3%) making October applications. June is the most popular month for warm-season grass fertilization; 76 percent of the professionals indicated they fertilize in this month.

Annual Rates of Nitrogen Application to Warm-Season Grasses

At the time this survey was conducted, recommended rates of nitrogen fertilization on warm-season lawns ranged from 1 to 4.5 lbs N/M/year, depending upon the level of quality desired and the source of nitrogen. The majority of the respondents (81%) were applying less than 5.1 lbs N/M, with 40 percent applying 3 lbs N/M or less and 2 percent applying 1 lb N/M or less. Seventeen percent of the respondents indicated they apply more than 5 lb N/M/year. One percent didn't know what their yearly rate of nitrogen application was.

Lawns

The vast majority (85%) of respondents fertilizing warm-season lawns were providing between 1 and 5 lbs N/M/year. Only 10 percent provided more than this and 5 percent utilized less than 1 lb N/M/year.

Golf Courses

One half of golf course superintendents (50%) were fertilizing Bermudagrass greens with more than 5 lbs N/M/year, while 33 percent were applying 3.1 to 5 lbs N/M/year. Forty-one percent of tees were receiving 3.1 to 5 lbs N/M with 38 percent receiving 1 to 3 lbs N/M/year. The majority (86%) of superintendents were providing 1 to 5 lbs N/M/year to fairways with 38 percent providing 1 to 3 lbs N/M/year and 12 percent applying more than 5.1 lb N/M/year. Roughs were fertilized at less than 3 lbs N/M/year by 36 percent with 45 percent applying between 3.1 and 5 lbs N/M/year. Only 14 percent applied more than 5 lbs N/M/year to roughs.

Other Areas

Sixty percent of the warm-season sod production fertilization and 67 percent of the warm-season athletic field fertilization provides between 1 and 5 lbs N/M/year. Forty percent of sod farmers and thirty percent of the athletic field managers provide more than 5 lbs N/M/year to warm-season grass.

General turf area fertilization included cemeteries, parks, recreational areas, median strips, campus grounds, etc. Most respondents (81%) indicated they provide 1 to 5 lbs N/M/year with only 11 percent providing more and 3 percent providing less. The largest group (61%) provided 1 to 3 lbs N/M/year.

Water Management

Respondents indicated the average amount of unirrigated maintained acreage was 61 percent. Eighteen percent did not irrigate and 16 percent said all of their acreage was irrigated. Two percent of the respondents indicated they have some acreage irrigated with drainage collection recycling systems.

Use of Biostimulants, and Nutrients other than Nitrogen

High percentages of respondents indicated they used lime (89%) and iron (67%) to enhance growth or color. Seventeen percent of the professionals indicated they have used biostimulants. Forty percent indicated they applied micronutrients in their nutritional program. Twenty-four percent of the respondents indicated that besides nitrogen, phosphorus and potassium, lime was the only other material they applied to enhance growth or color.

Frequency of Soil Testing and Laboratory Preference

The vast majority of respondents (85%) test at least once every four years, with two-thirds testing at least once every two years. Once a year soil testing is popular with many respondents (39%). Golf course greens were the most frequently tested and highways the least. Frequency of annual testing varied with area as follows: greens - 67 percent; sod farms - 58 percent; athletic fields - 44 percent; golf course tees - 41 percent; lawns - 35 percent; general turf areas - 33 percent; and golf course roughs 20 percent.

The Virginia Tech Soil Testing lab was the most popular with 49 percent indicating that was the only lab they used. Twenty-one percent indicated they use private labs exclusively and 15 percent indicated they used soil test kits exclusively.

Mowing Management and Clipping Disposal

Returning clippings to turf is a very desirable practice providing significant nutrition and avoiding the clipping disposal problem. Some uses of turf — such as golf greens — necessitate clipping removal. In addition, the need to remove clippings is determined by a combination of mowing frequency and height. The average percentage of time clippings were removed for the various managed areas was: golf greens - 96; golf tees - 54; lawns - 28; athletic fields - 11; general turf areas - 8; golf course fairways - 5; golf course roughs - 1; and highways - 0. For various turf areas, the proportion of respondents indicating they removed clippings 90 to 100 percent of the time they mowed was: lawns 13 percent; athletic fields 3 percent; sod farms 13 percent; golf courses greens 95 percent; tees 47 percent; fairways 2 percent; and roughs 0 percent. Conversely, the proportion of respondents indicating they only collected clippings 0 to 10 percent of the time they mowed were: lawns 44 percent; athletic fields 73 percent; sod farms 67 percent; golf course greens 2 percent; tees 38 percent; fairways 90 percent; and roughs 98 percent.

Tree Leaf Removal

Fall tree leaf removal is considered important in management of cool-season turfgrasses, because tree leaves which cover turf prevent photosynthesis in the fall and winter period. This reduces the production of stored food reserves and root growth and increases the potential for nitrate leaching. Most respondents indicated that tree leaf removal occurred over high percentages of the areas being maintained. The percentage of areas managed from which tree leaves were removed for the various areas was: golf greens - 87; golf tees - 86; lawns - 78; athletic fields - 66; general turf areas - 60; golf course fairways - 78; and golf course roughs - 67.

Turfgrass Clipping and Tree Leaf Disposal

Respondents who collected clippings and leaves were asked how they disposed of the material. With regard to grass clippings, 34 percent of the respondents indicated clippings were dispersed into adjacent areas, 25 percent transported clippings off-site, 21 percent composted on site, 12 percent recycled off-site and 9 percent stockpiled on site. For the tree leaves, 28 percent dispersed them into adjacent areas, 26 percent transported them off-site, 21 percent composted them on site, 14 percent stockpiled them on site and 11 percent recycled them off-site.

Survey Conclusions

The survey provides a limited estimate of nutrient management practices utilized by Virginia Turfgrass professionals. For the most part there is little indication of major nutrient management problems. However, the data does suggest some benefit may be derived from the educational promotion of lower rates of nitrogen use by some industry segments and the increased need for returning clippings to the lawn. In particular, educational programs should be developed targeting the 12 percent of respondents applying more than 5.1 lb N/M/year to cool-season grasses, the 20 percent applying more than 1.5 lb of soluble N/M in single applications, the 40 percent of sod producers, 30 percent of athletic field managers and 50 percent of bermudagrass greens managers applying more than 5 lbs N/M/year and the 18 percent of golf course superintendents applying more than 7 lbs N/M/year to cool-season golf greens. Programs encouraging the 28 percent of respondents collecting clippings on lawns to return them would help reduce yard waste management problems.

The indication that relatively small percentages of professionals are applying fertilizer to cool-season grasses in the January-February and July-August time frame is encouraging. Use of slow release materials is popular and the use of natural organics by 25 percent of the respondents is favorable for those with recycling interests.

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