Recommendations for Fertilizer Nitrogen Applications on Residential and Commercial Turfgrass

Long Island Nitrogen Action Plan - Fertilizer Management Workgroup - March 2019

Background

Fertilizer is the second leading source of nitrogen contamination of Long Island waters. The Long Island Nitrogen Action Plan (LINAP) Fertilizer Management Workgroup advised the LINAP project management team on recommendations that balance residents' desire for a healthy lawn with the need to significantly reduce nitrogen loads to Long Island's waterbodies.

These recommendations are the most comprehensive in the nation. New York State is leading the way by calling for lower nitrogen application rates and fertilizers with a large fraction of slowly available nitrogen to minimize nitrogen leaching to groundwater. When these recommendations are implemented, there will be up to a 40 percent reduction in fertilizer-sourced nitrogen entering the environment.

The recommendations are backed by scientific studies. Information from Suffolk and Nassau Counties Cooperative Extension, Suffolk County Department of Economic Development and Planning, Cornell University, the University of Connecticut, and Workgroup members are the primary sources relied upon to develop the recommendations.

Benefits of Implementation

These recommendations have the capacity to reduce the amount of nitrogen entering the environment by one to two pounds every time a typical-size lawn (5,000 square feet) is fertilized. This represents an approximate 40 percent decrease in fertilizer nitrogen loads. In one season, this could prevent hundreds of thousands of pounds of nitrogen from entering Long Island's waters.

These recommendations will not only remove a large amount of nitrogen going into our environment, but it would do so at a nominal cost to the consumers of nitrogen fertilizer. In contrast, treating water to reduce nitrogen is extremely costly, with wastewater treatment plants spending between $32 and $99 per kilogram[1] to remove nitrogen. For example, one of the major wastewater facilities in Long Island removes approximately 3,500 kilograms of nitrogen a day, which equates to an approximate cost of between $112,000 to $346,500 daily. This cost is borne by the wastewater treatment plant rate payers. Furthermore, according to information from Suffolk County Water Authority, it costs approximately

[1] Bricker, Suzanne et.al. "The Role of Shellfish Aquaculture in Reduction of Eutrophication in an Urban Estuary." Environmental Science Technology. (Jan 2 2018): 173-183.

$1.21 per 1,000 gallons to remove nitrogen from potable water sources (such as drinking water). Fertilizer reduction is one of the tools available to improve water quality and reduce occurrences of harmful algal blooms (HABs). Nitrogen pollution is linked to poor water quality, HABs, low shellfish landings and reduced enjoyment of the water. For example, it was documented that cyanobacteria (toxic algae) levels resulted in closing the Lake Ronkonkoma beach for a total of 59 days since 2013. Reducing nitrogen pollution will help improve the water, and recreational user of Long Island waters will benefit in being able to use the water more often and with a better experience.

The recommendations take a holistic approach, looking at not only the amount of fertilizer nitrogen applied, but also how lawns should be managed to be protective of the environment. For instance, the workgroup has provided recommendations governing irrigation management and fertilizer application. The average fertilizer consumer should expect to save money if they follow the fertilizer application and management practices contained in the Workgroup's recommendations, while also maintaining a healthy lawn.

Who is the LINAP Fertilizer Management Workgroup?

The LINAP Workgroup is comprised of key stakeholders, including environmental groups, fertilizer manufacturers, landscapers, nursery operators, garden supply retailers, golf course superintendents, and representatives from farming and governmental organizations. Most of the group members live and/or work on Long Island.

DEC formed the group in 2016, and it has met on six occasions to discuss the best way to reduce nitrogen fertilizer use. The Workgroup held meetings to engage with interested stakeholders as well as meetings that focused on the impact on key industry sectors. The Workgroup use experiential information, stakeholder feedback, and scientific studies to advise the Project Management Team on these recommendations. The Project Management Team is composed of NYSDEC, Long Island Regional Planning Council, and Suffolk and Nassau County.

Recommendations and Rationale

Application Rates

Recommendations

- The single application rate should be a maximum of 0.6 pounds of total nitrogen per 1,000 square feet.
- The annual application rate should be a maximum of 1.8 pounds of total nitrogen per 1,000 square feet.

Rationale

Fertilizer application rates are looked at from two perspectives. The first is the amount of nitrogen that is applied each time the lawn is fertilized; this is known as the single application rate. The second is how much fertilizer is applied over the entire season; this is known as the annual application rate. Lower application rates protect the quality of water in Long Island by reducing the amount of nitrogen applied to a lawn, while still maintaining healthy lawns.

Currently, many fertilizers on the market have single application rates ranging from 0.8 to 1.0 pounds of total nitrogen per 1,000 square feet. An application rate of 0.6 pounds of total nitrogen per 1,000 square feet would mean up to a 40% reduction in the amount of nitrogen applied each time someone fertilizers their lawn. Smaller application rates of nitrogen will decrease the potential of nitrogen leaching into the groundwater and are recommended for environmentally sensitive areas, like Long Island, that have sandy soils.[2]

A typical annual application rate is 4.0 pounds of total nitrogen per 1,000 square feet. The annual application rate recommendation is structured to accommodate the additional nitrogen derived from atmospheric deposition[3] and the nitrogen available when grass clippings[4] are left on the lawn. Reducing the annual application rate to 1.8 pounds of total nitrogen per 1,000 square feet would mean a reduction by 50 percent, annually. Research shows that the annual application rate in environmentally sensitive areas, like Long Island, should be less than 2.0 pounds of total nitrogen per 1000 square feet.[5] Suffolk County recommends for typical residential lawns zero to 2 pounds of total nitrogen per 1,000 square feet each year.[6]

Fertilizer Product Packaging

Recommendations

- Application directions should be provided in both English and Spanish.
- The default (or standard) directions for equipment settings on product packaging should be the single application rate of 0.6 pounds of total nitrogen per 1,000 square feet.

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[2] New England Interstate Water Pollution Control Commission. *Regional Clean Water Guidelines for Fertilization of Urban Turf.* New England Interstate Water Pollution Control Commission. (2017): 12.

[3] New England Interstate Water Pollution Control Commission (NEIWPCC).The Impact of Atmospheric Nitrogen Deposition on Long Island Sound. Long Island Sound Study. (1997).

[4] Portmess, R. & Petrovic, A.M. Nitrogen Fertilizer Management of Turfgrass in Suffolk County. Cornell University. (2010): 6.

[5] New England Interstate Water Pollution Control Commission. *Regional Clean Water Guidelines for Fertilization of Urban Turf.* New England Interstate Water Pollution Control Commission. (2017): 10.

[6] Suffolk County Department of Economic Development and Planning; Division of Water Quality Improvement. *Healthy Lawns Clean Water. "*How Much Lawn Fertilizer Should I Apply?" (2018).

- The recommended single and annual application rates should be clearly and prominently stated on the packaging.
- The product packaging should state the total square footage of lawn that the package will cover when applied at the single application rate.
- The slowly available nitrogen content as a percent of the total nitrogen contained in the product should be clearly stated on the product packaging.
- A statement such as "Apply this product as directed on the label. Do not overapply product. Overapplication can lead to poor water quality" should be included on the product packaging.

Rationale

Fertilizer packaging and proper directions are crucial to limiting the amount of nitrogen that ends up in the water due to misapplication. Therefore, it would be beneficial for consumers to have the recommended single and annual rates clearly stated, as well as directions for fertilizer spreader equipment settings on how to achieve those rates.

Other states have required single application rates. However, fertilizer package labels fail to give the consumer information on how to apply the fertilizer to achieve the required rate. This leads to the possibility that people may overapply and use the whole bag in a single application. Matching the size of the bag to the recommended application rate helps minimize overapplication and results in less excess nitrogen on the lawn. According to one Florida study, 88% of people read and follow the directions on a bag of fertilizer.[7]

Directions in English and Spanish will benefit non-English speaking homeowners and landscape workers.

Percent Slowly Available Nitrogen in the Fertilizer

Recommendation

- At least 50 percent of the nitrogen in any turfgrass fertilizer product should be "slowly available nitrogen."

Rationale

Lawn fertilizer often contains a mix of quick release nitrogen (water soluble nitrogen) and slow release nitrogen (water insoluble nitrogen). Quick release nitrogen is immediately available to the plant and slow release nitrogen allows for the plant to take up addition nitrogen overtime. Nitrogen that the plant does not use will leach into the groundwater and causes pollution.[8] Suffolk County recommends using a fertilizer that contains at least fifty percent slow release nitrogen, which is less likely to leach and is a good choice for very sandy soils.[9]

Application Dates

[7] Southwest Florida Water Management District. Final 2011 Fertilizer Pre- and Post-Advertising Campaign Survey Study. (2011): 6.

[8] Brewer, L. J**.** *Lawn Care - The Easiest Steps to An Attractive Environmental Asset.* Ithaca, NY : Cornell University, (2014).

[9] Suffolk County Department of Economic Development and Planning; Division of Water Quality Improvement. *Healthy Lawns Clean Water. "*How Much Lawn Fertilizer Should I Apply?" (2018).

Recommendation

- Application of fertilizer to lawns and non-agricultural turf should not occur between November 1 and April 1, annually.

Rationale

Grass can only absorb fertilizer when it is actively growing. Turfgrass plants stop growing and become dormant when the soil temperature is below 55°F or in the heat of the summer. Cooler soil temperatures also slow the bacterial action that makes some fertilizer nutrients available to the plants. Fertilizer not absorbed by grass leaches into the subsoil and makes its way into groundwater or runs off into surface water. These application dates are consistent with Suffolk County's existing law[10] and would minimize fertilizer runoff and leaching.

Retail Sales

Recommendations

- Fertilizer should not be sold between November 1 and March 15.
- Fertilizer products should be removed from display on the sales floor between November 8 and March 15.

Rationale

Currently, there is nothing preventing consumers from purchasing and applying a bag of fertilizer after the application dates mentioned above. Recommending that retailers not sell or display fertilizer for a specific period minimizes the likelihood of a consumer applying fertilizer outside of the recommended application dates. Limiting the sale of fertilizer to March 15 would allow customers a two-week period to purchase fertilizer before the application period opens.

Application Restrictions

Recommendations

- Fertilizer products should not be applied on any impervious surface including parking lots, roadways, storm drains, frozen ground, and sidewalks, or where there is standing water on turf. If such application occurs, the fertilizer should be immediately contained and either applied to lawn or non-agricultural turf or placed in an appropriate container.
- Fertilizer products should not be applied to any lawn or non-agricultural turf on any real property within twenty feet of any surface water, except that this restriction should not apply where a continuous natural vegetative buffer, at least ten feet wide, separates an area of lawn or non-agricultural turf and surface water, and except that, where a spreader guard, deflector shield or drop spreader is used to apply fertilizer, such application should not occur within three feet of any surface water. This should not apply to an application of fertilizer for newly established lawn or non-agricultural turf during the first growing season.

Rationale

New York State's current Nutrient Runoff Law requires that any person applying fertilizer adheres to the above restrictions.[11] "Frozen ground", "standing water" and "storm drains" were added based on work

[10] Suffolk County Local Law #41 of 2007. A Local Law to Reduce Nitrogen Pollution by Reducing Use of Fertilizer in Suffolk County. 7 November 2007.

[11] DEC, NYS. Nutrient Runoff Law. Title 21, Article 17 of Environmental Conservation Law. NYS Department of Environmental Conservation. (2012)

group feedback. If fertilizer is applied to impervious surfaces or near surface water, it is highly likely that the fertilizer will end up in either groundwater or surface water. Restricting this type of application will minimize water contamination and will protect water quality.

Golf Courses

Recommendations

- Fertilizer should only be applied between April 2 and October 31.
- Application must still comply with the requirements listed in the "Application Restrictions" section. This is in adherence with the Nutrient Runoff Law (Title 21 of Article 17 of Environmental Conservation Law).
- A seasonal limit should be implemented on the amount of nitrogen applied per calendar year not to exceed 2.7 pounds of total nitrogen per 1,000 square feet.
- Applicants should only apply fertilizer that has at least forty percent slowly available nitrogen, and following the below guidelines:
    - a single granular fertilizer application rate of no more than 0.7 pounds per thousand square feet of total nitrogen, and no more than 0.5 pounds per thousand square feet per application of one hundred percent liquid, water soluble fertilizer.
- Golf courses may exceed the application rate of fertilizer when the turf grass has suffered a loss of greater than 10 percent turf loss per thousand square feet.
- Owners of golf courses should maintain records of application dates and rates.

Rationale

The greater application rates for golf courses would allow the heavily-used turf to remain healthy, while significantly reducing the amount of nitrogen that could be released in the water. These recommendations align with *Cornell University's Best Management Practices for Golf Courses*, an industry standard.[12]

Best Management Practices

Grass Clippings

Recommendation

- Grass clippings from the mowing of lawns and all non-agricultural turf should be left on the lawn.

Rationale

Clippings are high in nutrients and should be treated as if they were a fertilizer.[13] Grass clippings should be returned to lawns to reduce the need for added nitrogen by 25 to 50 percent.[14] The decomposing of the clippings releases the nitrogen at a rate that the grass can use it, minimizing the likelihood of nitrogen leaching into the groundwater.

Calibration

[12] Cornell University. *Best Management Practices for New York State Golf Courses.* (2014).
[13] Guillard, K. New England Regional Nitrogen and Phosphorus Fertilizer and Associated Management Practice Recommendations for Lawns Based on Water Quality Considerations. University of Connecticut. (2008): 9.
[14] Brewer, L. 2005. The Easiest Steps to an Attractive Environmental Asset. School of Agriculture and Life Science. Ithaca : Cornell University, 2005.

Recommendation

- All equipment used to spread fertilizer should be calibrated to a single application rate of a maximum of 0.6 pounds of total nitrogen per 1,000 square feet at least once annually or each time fertilizer products are changed.

Rationale

Spreaders must be properly calibrated if they are to deliver fertilizers to turf at correct application rates. If calibration is not done or done incorrectly, the product may be misapplied and either too much or too little of the product will reach the turf.[15] Calibration directions are included on spreaders used by professionals and spreaders marketed to individuals should be able to be readily calibrated to a rate of 0.6 pounds of total nitrogen per 1,000 square feet.

Irrigation

Recommendations

- Irrigation systems should be operational and ready for use prior to any fertilizer application. Systems should be able to provide an application of ¼ inch of water to fertilized areas within 24 hours of application, if no rainfall has occurred.
- Systems should be equipped with either a rain sensor, moisture sensor or an EPA Water Sense approved smart controller or any combination of these devices.
- Systems should be in proper working condition, such as having no broken or malfunctioning equipment, and work to the capabilities as designed.
- As consistent with Nassau County Regulations, systems should not run between the hours of 10:00am and 4:00pm daily; except where new sod/seed lawns are being grown and/or where an application of pesticides requires immediate watering as directed on the label.
- Systems should not provide more than 1 ½ inch of supplemental water per week.
- Systems should not run during rainfall.

Rationale

Making sure irrigation systems are in proper working order will help reduce overwatering lawns, which can lead to leaching nitrogen into the groundwater. Fertilizer manufacturers and scientists both recommend light watering after fertilizer application.[16] Irrigation control technologies can significantly reduce overwatering by applying water only when plants need it. [17] In the Nassau County Ordinance No. 248-A-1987, there is a prohibition against irrigation between 10:00 am and 4:00 pm.

[15] PennState Extension. *Calibrating Your Fertilizer Spreader* (2018).
[16] Suffolk County Department of Economic Development & Planning. *Healthy Lawns Clean Water*. "For Homeowners: Fertilizer Application Tips."
[17] US EPA. Water Sense. "Water Sense Labelled Irrigation Controllers." (2017).