

Nutrient Management Guidelines for Turfgrass Seeding and Sod Installation



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Elevated levels of nitrogen (N) and phosphorus (P) have been identified as major contributors to the decline of the health of the Chesapeake Bay. As such, potential sources for the movement of these nutrients into waters impacting the Bay have been identified and goals have been established for the reduction of N and P loads entering the Bay. Potential sources include agricultural production, air pollution, point sources including waste treatment facilities, leakage from sewer infrastructure, septic systems, runoff from impervious surfaces, pet and animal waste, and other urban inputs including fertilization of landscapes.

Nutrient management regulations passed by the Maryland Legislature in 1998 require that commercially established turfgrass be fertilized according to University of Maryland Cooperative Extension guidelines. When establishing a new site by seeding turfgrass, proper fertilization at the time of establishment is essential for obtaining a satisfactory stand of turfgrass for both the short and long-term. In 2011, additional regulations were enacted that further specify how N and P may be applied to turfgrass in Maryland. These regulations regarding turfgrass fertilizer applications became effective in 2013. The following information serves as a nutrient management guideline for the establishment of turfgrass from seed or by laying sod in Maryland.



Soil Erosion Can be Greatly Minimized by Proper Seedbed Fertilization and Rapid Turfgrass Establishment. Soil Erosion Can Be A Major Source of Chesapeake Bay Nutrient Pollution.

One of the major concerns regarding the health of the Chesapeake Bay is soil erosion and the subsequent movement of nitrogen (N) and particularly phosphorus (P) into the Bay. Thus, the rapid establishment of turfgrass on disturbed soil is environmentally important and can drastically reduce the movement of soil, and thus, nutrients, by erosion into sensitive areas. A critical factor in the rapid establishment of turfgrass is providing adequate N and P at the time of establishment. In addition, once turfgrass has been established successfully, soil loss is negligible, water runoff is greatly reduced, and water infiltration is increased.

Phosphorus Applications

Research has shown that P is essential for the growth and development of seedling turfgrass. Inadequate P in the seedbed will result in poor initial growth and a stand that rapidly thins, resulting in a site that is prone to soil erosion and weed encroachment. Providing adequate P at the time of seeding will reduce long-term weed encroachment problems, reduce soil erosion, and reduce runoff while increasing water infiltration.



No phosphorus was added during establishment of the research plot on the left. Phosphorus was added during establishment according to soil test recommendations to the research plot on the right. Photos were taken 8 weeks after seeding. The no phosphorus plot exhibits very poor density, substantial weed encroachment, and is highly susceptible to soil erosion compared to the recommended P fertilization.

The specifics of the turfgrass fertilizer regulations as they relate to the application of P during the establishment of a turfgrass stand from seed or from laying of sod:

1. Although highly recommended, a soil test for P application to the seedbed or prior to laying of sod is not required if the following conditions are met:
 - a) the nutrient application is made for the purpose of establishing turf on bare ground, and
 - b) the application rate is made in accordance with the seeding recommendations of the University of Maryland Extension guidelines (Table 1), and
 - c) the land has been disturbed, such as by construction or tillage, or
 - d) a lawn patch product is used.

It should be noted that although a soil test is not required under the aforementioned conditions, it is still highly advisable if time permits. Excessively low soil pH is a common problem affecting new seedlings, and proper liming recommendations can only be obtained with a proper soil test.

2. A soil test is required for P applications if an existing turfgrass area is being overseeded but the area is not being tilled. For example, over-seeding existing athletic fields, fairways, tees, or lawns with a slicer-seeder would require a soil test before P can be applied.

3. Soil tests shall be associated with individual properties or management units. Areas with different soil types, soil conditions, or different past uses or management histories must be sampled separately.

4. No P can be applied to a seedbed or an area to be sodded between November 15 and March 1. Thus, any establishment efforts during this blackout period must be done without the application of a P containing product. On soils testing low in P, it would be advisable to delay seeding until after March 1 so that P can be applied at the time of seeding.

Table 1. Phosphorus Application Recommendations for Turfgrass Seeding or Sod Installation*

Phosphorus Application Depth	Phosphorus Soil Test Category			
	Low	Medium	Optimum**	Excessive
	Lbs. P ₂ O ₅ /1000 ft ²		(Lbs.P ₂ O ₅ /acre)	
Broadcast	2 - 3 (90– 130)	1 – 2 (45 – 90)	0 – 1 (0 – 45)	0
Incorporated to a depth greater than 2 inches	3 - 4 (130 – 175)	1 – 2 (45 – 90)	0 – 2 (0 – 90)	0

*When no soil test has been obtained (as allowed under the conditions described previously), the P recommendations for the medium P soil test category should be used. A soil test is required to determine if any additional P applications may be warranted after establishment.

**In cool weather, seedbed application of P may prove beneficial despite soil test results that indicate “optimum” levels of soil P.

Potassium Applications

Potassium is generally not critical during the establishment phase of turfgrass unless soil levels are particularly low. However, adequate potassium can be important for established turf in improving tolerance to environmental stresses and wear, and may increase the resistance to some diseases. It is recommended that soil K levels be adjusted at the time of seeding so that no deficiencies develop as the turfgrass matures. This is particularly advisable if fertilizer is being incorporated into the soil during soil preparation so that the entire potential root zone can be modified. Potassium applications are not regulated in Maryland.

Table 2. Potassium Application Recommendations for Turfgrass Seeding or Sod Installation

Potassium Application Depth	Potassium Soil Test Category			
	Low	Medium	Optimum	Excessive
	Lbs. P ₂ O ₅ /1000 ft ²		(Lbs.P ₂ O ₅ /acre)	
Broadcast	2 - 3 (90– 130)	1 – 2 (45 – 90)	0 – 1 (0 – 45)	0
Incorporated to a depth greater than 2 inches	3 - 4 (130 – 175)	1 – 2 (45 – 90)	0 – 2 (0 – 90)	0

Nitrogen Applications

Nitrogen has a dramatic impact on root, shoot, rhizome, and stolon growth rates of turfgrass plants. Adequate N is essential in maintaining a dense turfgrass stand that minimizes soil erosion, increases water infiltration, competes against weed encroachment, and recovers from physical or biological damage. However, excessive N may reduce resistance to some diseases and drought tolerance, and could potentially leach if the amounts applied exceed the amount utilized by the turfgrass plant.

A wide range of N-containing fertilizers are available. These fertilizers generally fall into one of two broad categories, 1) fertilizers that contain only soluble, quickly available N, and 2) fertilizers that contain some N in a slowly available form which is not immediately available for plant use. **The amount of N that can be applied to a turfgrass seedbed or prior to installation of sod is regulated based on the type of N-fertilizer being applied.**

Nitrogen recommendations are not obtained from soil tests; however, extensive research has been conducted to determine rates that are adequate for successful turfgrass culture. Whereas N rates recommended for maintaining turfgrass vary considerably depending on a variety of factors such as turfgrass species, length of growing season, management practices, and use, the N rates recommended for establishing turfgrass from seed or installation of sod are generally uniform. Following are the restrictions imposed on N applications prior to turfgrass seeding or sod installation:

1. No N can be applied to a seedbed or an area to be sodded between December 1 and March 1. Between November 15 and November 30, 0.5 lb. N/1000 ft² (22 lb. N/acre) using a soluble N source can be applied to these areas, but no P can be applied during this period. Thus, any establishment efforts during this blackout period must be done without the application of N or P fertilizer.
2. Between March 1 and November 15, N can only be applied at a maximum rate of 0.7 lb. N/1000 ft² (30 lb. N/acre) if a soluble N source is used. If a slow release N source is used, a maximum of 0.9 lb. N/1000 ft² (39 lb. N/acre) can be used. To be considered a slow release N fertilizer, the fertilizer must contain at least 20% water insoluble or controlled release N.
3. An enhanced efficiency N fertilizer can be applied to a seedbed or an area to be sodded at the rate of 2.5 lb. N/1000 ft² (109 lb. N/acre), but not to exceed 80% of the total annual N rate recommended for maintenance of the turfgrass species used. Enhanced efficiency N fertilizers are a type of slow release N fertilizer that further decrease the potential of nutrient loss to the environment and release less than 0.7 lb. N/1000 ft² per month. In addition, the amount of N applied from the enhanced efficiency fertilizer must be accounted for in the following year's N maintenance applications. The enhanced efficiency N fertilizer must have been formally classified and approved for use in Maryland by the Maryland State Chemist's Office.
4. The amount of compost that can be applied during establishment is dependent on incorporation techniques. If compost is tilled into the soil, it is considered a soil amendment and nutrient analysis is not required. One inch of compost tilled into a 6-inch depth is generally recommended.
5. However, if compost is not tilled into soil, it must be considered a fertilizer. Compost and natural organic fertilizers used during the establishment of turf areas must take into account their N and P content. Compost materials must have a nutrient content analysis within the last 12 months. Compost and natural organic fertilizers cannot be applied at a rate greater than the N and P allowed by the Maryland fertilizer regulations for establishment (Table 1).



Compost applications that are tilled into a 6-inch depth are considered a soil amendment. Otherwise, they are regulated as a fertilizer application.

Soil Reaction

Maintaining soil pH in an optimum range is important for maximizing the efficiency of nutrient use, and can be important in reducing weed and disease problems. Turfgrass can withstand a rather broad range of soil pH, but 5.8 to 6.4 are generally considered ideal. Wide deviations from this range can result in reduced P and micronutrient availability, and can interfere with soil N metabolism and availability. Depending on turfgrass species, problems in turf may start to occur at soil pH above 7.8 and below 5.4. Thus, to maximize efficiency of nutrient availability and use, soil tests should be taken as recommended previously for soil P and K to determine soil pH.

If diseases such as take-all patch of bentgrass, summer patch of Kentucky bluegrass, or spring dead spot of bermudagrass are of concern, maintaining lower soil pH (5.4-5.7) may be desirable, and reduced or no limestone should be applied to achieve this level. Also, it is recommended, when practical, that limestone be applied approximately one month or more before seeding to minimize potential P availability problems and the potential for volatilization loss of applied N.

It should be emphasized that the information presented within this publication for N, P, K, and limestone applications is meant only as a guideline. While these recommendations should result in satisfactory establishment in most situations, there are many factors that could impact whether modifications of these recommendations are warranted for a specific site.

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