



MANAGING YOUR FERTILIZER NUTRIENT INPUTS



The Fertilizer Institute
Nourish, Replenish, Grow

Turf grasses have many benefits that can be separated into functional, aesthetic & recreational components.

FERTILIZER NUTRIENTS ARE CRITICAL TO MAXIMIZING THESE BENEFITS AND TO MAINTAINING HEALTHY AND RESILIENT TURF FOR RECREATION AND EXERCISE. AMONG THE OBJECTIVES OF SOUND GOLF COURSE MANAGEMENT IS THE ADOPTION OF FERTILIZER BEST MANAGEMENT PRACTICES THAT PROMOTE BOTH ENVIRONMENTAL AND SOCIAL STEWARDSHIP GOALS.

A sound fertilization program is necessary to maintain healthy and functional greens, fairways and other turf areas. Turf grasses, and for that matter any other plants such as trees and shrubs on your golf course, require at least the three primary fertilizer nutrients – nitrogen, phosphorus and potassium – for proper growth and function. Additionally, there are a number of secondary and micronutrient elements like sulfur, calcium, magnesium, iron and manganese that may be necessary. Fertilizer materials deliver needed nutrients in the right amounts to keep turf and other plant materials on the golf course growing and healthy.

Among the best ways to determine specific fertilizer needs is a regular soil testing program. Soil testing and the resulting recommendations are by no means an exact or absolute science, but it is nevertheless the best place to start learning about your turf's nutritional needs. Soil testing is an effective tool enabling the turf manager to make environmentally friendly and economical decisions about products to apply and fertilizer rates.

Proper fertilization is often among the most cost-effective means of achieving an attractive golf course landscape. Fertilizer best management practices (BMPs) ensure that fertilizers are used to maximum benefit without negatively impacting the environment. BMPs involve applying the right product, at the right rate, right time and right place.



NITROGEN (N)

is a primary building block for all organisms. It is essential to making proteins, helps keep plants green and is a critical component of soil organic matter.

COMES FROM THE AIR



PHOSPHORUS (P)

is found in every living cell. Phosphorus is a component of DNA and it also plays vital roles in capturing light during photosynthesis, helping with seed germination, and helping plants use water efficiently. Plants also use phosphorus to help fight external stress and prevent disease.

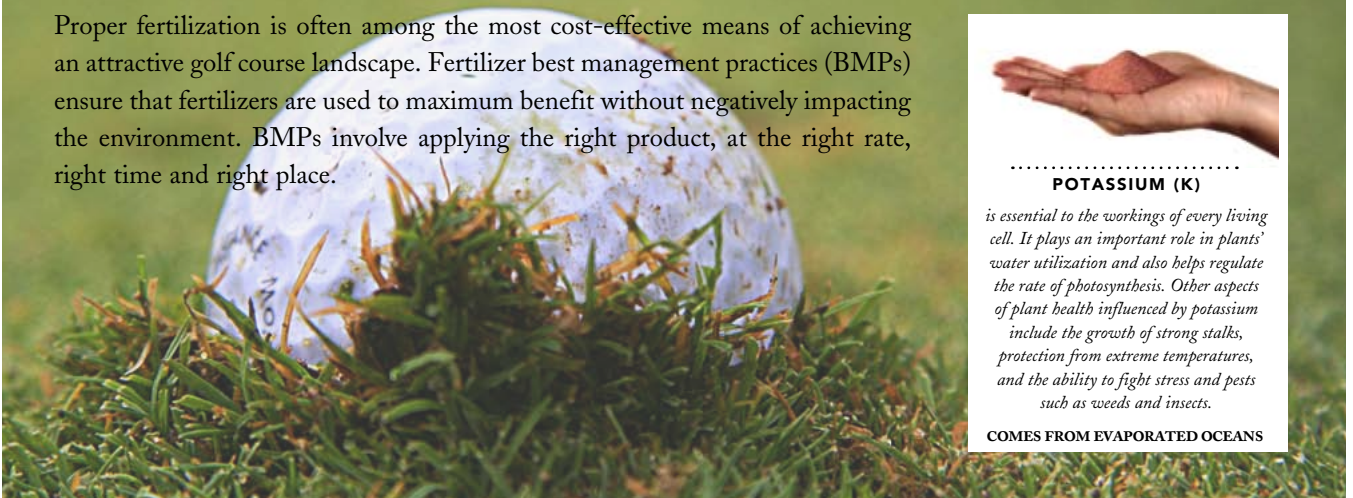
COMES FROM ANCIENT SEA LIFE



POTASSIUM (K)

is essential to the workings of every living cell. It plays an important role in plants' water utilization and also helps regulate the rate of photosynthesis. Other aspects of plant health influenced by potassium include the growth of strong stalks, protection from extreme temperatures, and the ability to fight stress and pests such as weeds and insects.

COMES FROM EVAPORATED OCEANS



Providing a proper nutrient balance is vital to keeping turf areas green & growing the varied landscapes of golf courses.

IN TURN, A HEALTHY LAWN PROVIDES A NUMBER OF ADDITIONAL FUNDAMENTAL BENEFITS.

Fertilizer inputs applied based on sound BMPs can enhance the golfer's recreational experience. They can enjoy the visual benefits of the layout and condition of the course – their experience on the green can in turn lead to numerous therapeutic benefits. A healthy golf course also promotes a safe and stable environment. For example, fertilizer nutrients that improve turf health also help hold soil resources in place and prevent them from being eroded into waterways. In addition, healthy golf courses support and provide habitat to native wildlife.

Through enhanced photosynthesis, healthy turf also gives off more oxygen, helping to balance the earth's atmosphere. In addition, healthy turf can serve as an important filtration system and can trap and help decompose large amounts of pollutants each year. It helps recharge groundwater supplies and reduces the strain on municipal water treatment systems.

BENEFITS

BASED LARGELY ON A CLASSIC PUBLICATION BY BEARD AND GREEN (1994), SOME OF THE FUNCTIONAL BENEFITS OF A HEALTHY TURF ARE:

- Soil erosion control; Dust stabilization; Enhanced groundwater recharge and improved surface water quality; Improved entrapment and decomposition of synthetic chemical pollutants; Soil improvement and restoration; Heat dissipation and temperature moderation; Noise abatement; Glare reduction; Sequestration of carbon dioxide

AESTHETIC BENEFITS:

- Positive therapeutic benefits can improve mental health and productivity; Contributes to social harmony and stability; Improved quality of life

RECREATIONAL BENEFITS:

- Low-cost, safe surface; Exercise and diversion beneficial to mental health



Approximate N requirements for warm-season and cool-season turf grass species per growing month ¹							
Common name	N requirement ² Pounds N per 1,000 ft ² per growing month		General N require- ment	Common name	N requirement ² Pounds N per 1,000 ft ² per growing month		General N require- ment
	General Turf	Recre- ational			General turf	Recre- ational	
Warm-season turf grass				Cool-season turf grass			
Bahiagrass	0.0-0.2	0.1-0.5	Low	Alkaligrass	0.0-0.2	0.2-0.4	Very Low
Bermuda grass				Annual bluegrass	0.3-0.5	0.4-0.8	Low-Med.
* Common types	0.2-0.4	0.4-0.7	Low-Med.	Canada bluegrass	0.0-0.2	0.2-0.4	Very Low
* Hybrid types	0.4-0.6	0.6-1.5	Med.-High	Colonial bentgrass	0.3-0.5	0.4-0.8	Low-Med.
Blue grama	0.0-0.2	0.2-0.4	Very Low	Creeping bentgrass	0.3-0.6	0.3-1.0	Low-High
Buffalograss	0.0-0.2	0.2-0.4	Very Low	Fine Fescues			
Carpetgrass				* Chewings	0.2-0.4	0.3-0.5	Low
Centipedegrass	0.0-0.3	0.3-0.4	Very Low	* Creeping	0.2-0.4	0.3-0.5	Low
Kikuyu	0.2-0.3	0.3-0.6	Low-Med.	* Hard	0.2-0.4	0.3-0.5	Low
Saltgrass	0.0-0.2	0.1-0.4	Very Low	* Slender	0.2-0.4	0.3-0.5	Low
Seashore paspalum	0.2-0.4	0.4-0.8	Low-Med.	Kentucky bluegrass			
St. Augustinegrass	0.3-0.5	0.4-0.6	Low-Med.	* Common	0.1-0.3	0.2-0.6	Low-Med.
Zoysiagrass				* Improved	0.3-0.4	0.4-0.8	Medium
* Common	0.1-0.3	0.3-0.5	Low-Med.	Perennial ryegrass	0.2-0.4	0.4-0.7	Low-Med.
* Improved	0.2-0.3	0.3-0.6	Low-Med.	Rough bluegrass	0.2-0.4	0.4-0.7	Low-Med.
				Tall Fescue	0.2-0.4	0.3-0.7	Low-Med.
				Velvet bentgrass	0.3-0.5	0.4-0.8	Low-Med.
				Wheatgrass	0.1-0.2	0.2-0.5	Low

¹ Growing month is when the grass is actively growing and not dormant or semidormant.

² Nitrogen requirement rates per month are for determining total N needs based on the number of growing months per year. General turf = lawns, amenity turf, general grounds; Recreational turf = grasses used for golf courses, bowling greens and sports.

Source: Carrow et al., 2001

A BALANCED AND HEALTHY TURF LOSES FEWER NUTRIENTS THAN ILL-MANAGED TURF.

Healthy grass helps retain nitrogen and phosphorus in the root zone & prevents possible leaching down into the groundwater.

THIS IS WHY IT IS IMPORTANT TO ADOPT A SUSTAINABLE PROGRAM BASED ON THE 4R NUTRIENT STEWARDSHIP SYSTEM – USING THE RIGHT FERTILIZER NUTRIENTS AND APPLYING THEM AT THE RIGHT RATE, RIGHT TIME AND RIGHT PLACE

RIGHT PRODUCT: Many fertilizer products are available for golf course consumption. Nitrogen products for turf are often formulated to have slow or controlled release properties and are sometimes called “enhanced efficiency fertilizers.” These materials are designed to release nutrients more slowly than common conventional fertilizers. Some of the enhanced efficiency fertilizer materials have been available for many years, while some have been more recently developed. In addition, the fertilizer industry remains committed to continue to discover more ways to improve these technologies. The fundamental benefit of enhanced efficiency fertilizers is that fewer applications can usually achieve a similar outcome to that of more frequent applications of quick release fertilizer with a lesser environmental footprint.

Slow release N fertilizer materials will generally fall into one of three categories based on mechanism of release-coated materials, fertilizer released by microbial breakdown and low water solubility fertilizers. Additionally, the use of urease and nitrification inhibitors with certain soluble fertilizer materials can substantially improve N fertilizer performance.

RIGHT RATE AND TIME: The goal here is to match the amount of fertilizer nutrients to the turf needs and provide

nutrients when they are needed. Right rate and timing will be determined to some degree by factors that include:

- o Grass species: The appropriate species will mainly be determined by location. Nutrient requirements vary widely among grass species.
- o Soil environment: A soil test will help determine BMPs for your specific situation. Soil type has a big impact on best fertilization practices of turf. For example, sandy soils are usually more infertile and require more intensive nutrient management programs than loamy or clayey soils.
- o Rainfall and irrigation: Turf grows more vigorously with adequate water but excessive rainfall can also cause nutrient losses in runoff or leaching and result in deficiencies.
- o Exposure to sunlight: Shaded areas generally require less fertilizer than non-shaded areas. Turf in shaded areas also tends to have a weaker root system and to be more succulent.

RIGHT PLACE: In order to keep nutrients where turf can use them and avoid runoff into waterways, it is important to consider the use of buffer strips around water bodies, as well as to prevent fertilizer nutrients from reaching impervious surfaces such as asphalt and driveways.

BEST MANAGEMENT PRACTICES (BMPs)



RIGHT PRODUCT

MATCH FERTILIZER TYPE TO PLANT NEEDS

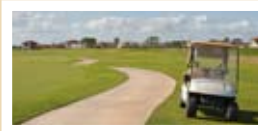
- Soil Testing
- Macro, Secondary and Micronutrients
- Nutrient Management Planning
- Enhanced Efficiency Fertilizers



RIGHT TIME

MAKE NUTRIENTS AVAILABLE WHEN PLANTS NEED THEM

- Application Timing
- Controlled Release Technologies
- Urease and Nitrification Inhibitors
- Fertilizer Product Choice



RIGHT PLACE

KEEP NUTRIENTS WHERE PLANTS CAN USE THEM

- Application Method
- Blow or Sweep Hardscapes
- Topdress into Container Only
- Sweep nutrients off of the path and back onto the turf



RIGHT RATE

MATCH AMOUNT OF FERTILIZER TO PLANT NEEDS

- Soil Testing
- Spreader Calibration
- Record Keeping
- Site Specific Management

1 WHAT ARE SOME OF THE PROCEDURES TO FOLLOW TO HAVE YOUR SOIL TESTED?

Collecting a representative sample is the first step in obtaining meaningful soil test results. For established turf, several samples should be taken to a depth of three to four inches in areas where topography and soil type are similar and then combined into one composite well-mixed sample for analysis. Soil testing is usually recommended every one to four years, but in intensive management situations, more frequent testing may be necessary. Soil samples can be taken at any time, but it is important that they be taken prior to fertilization and at least 30 days after a fertilizer application. Follow laboratory guidelines for best results.

2 WHAT FACTORS INFLUENCE THE PRICE YOU PAY FOR FERTILIZER PRODUCTS?

The turf care industry is facing some of the same challenges as the global agriculture industry. Nowadays, when you purchase a bag or a load of fertilizer, you're competing with farmers from across the globe. Average prices that U.S. farmers paid for the major fertilizer nutrients reached the highest level on record in September 2008. Prices have moderated since reaching these record levels and were down 24 percent from September levels by January 2009, as falling crop prices have impacted global fertilizer demand. Nonetheless, as the world population continues to grow, demand for these essential nutrients will continue to rise over time in order to meet the challenge of improving diets and increasing world population.

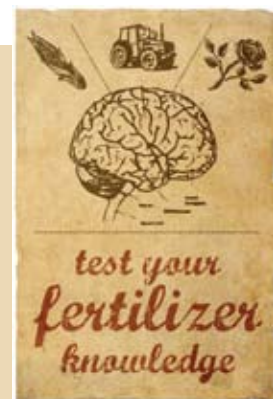
3 HOW MUCH OF ITS FERTILIZER DOES THE UNITED STATES NOW IMPORT?

The United States now imports over 50 percent of its nitrogen and over 90 percent of its potash. The United States is the world's largest phosphate producer due to

its large phosphate rock reserves and exports about 55-60 percent of its phosphate production annually.

4 WHAT HAS HAPPENED TO DOMESTIC NITROGEN PRODUCTION?

High natural gas prices have caused 26 U.S. ammonia plants to close since fiscal year 1999, and several additional plants remain idle. As a result, U.S. ammonia production fell by 6.2 million tons of nitrogen or by over 42 percent since fiscal year 1999. Consequently, the U.S. fertilizer industry which typically supplied 85 percent of farmers' domestic nitrogen needs from U.S. based production during the 1990s, now relies on nitrogen imports for over half of new nitrogen supplies.



KEY MESSAGES ABOUT FERTILIZER

1. Fertilizers are drawn from nature — they are not man-made.
2. Farmers are not adding fertilizers to the ground. They are replacing nutrients that are lost at each harvest.
3. The world has no choice but to use fertilizers. Without them, more than two billion people would starve.
4. By helping conserve land, fertilizers safeguard recreational land and wildlife habitats.
5. Farmers care about the environment as much as anyone.



SOME TECHNICAL CONTENT TAKEN FROM *BEST MANAGEMENT PRACTICES FOR TURF AND LAWN FERTILIZATION*. REF. #08061. INTERNATIONAL PLANT NUTRITION INSTITUTE. NORCROSS, GA.

For more information: www.ipni.net



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