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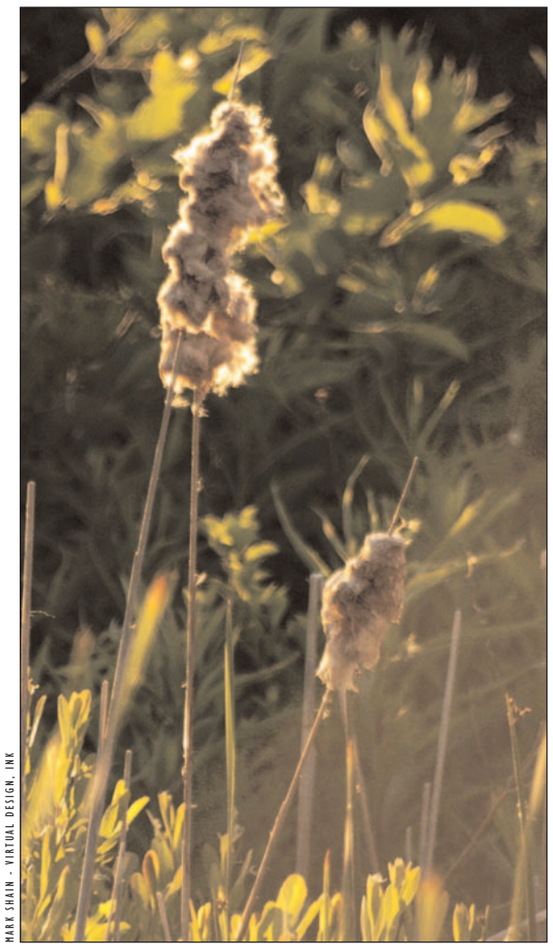
FERTILIZER BASICS

ARE YOU FEEDING YOUR PLANTS, OR THE LAKE?



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FERTILIZER BASICS

ARE YOU FEEDING YOUR PLANTS, OR THE LAKE?

IT'S NOT JUST A DROP IN THE BUCKET – YOU CAN MAKE A DIFFERENCE…

Water is a precious resource in Maine. Homeowners can do their part to protect ground and surface water by following proper fertilization procedures.

Individual lawns and planting beds are small but the total areas of lawns and planting beds in urban environments is significant. Proper fertilization will enhance plant growth without polluting the environment. However, misuse of fertilizer can harm the environment and injure landscape plants by causing fertilizer to burn the leaves and/or roots.

The pollutants homeowners can control and manage effectively can be divided into three categories:

1. Domestic pollutants include animal wastes, household chemicals, waste oil, septic systems, pesticides and fertilizer.
2. Agricultural pollutants include eroded soil, animal wastes, fertilizer and agrochemicals.
3. Urban pollutants include all the domestic pollutants, landfills, leaking sewage pipes, storm water catchments, chemicals from streets and parking lots and sediment from construction and sewage treatment plants.

NUTRIENTS THAT AFFECT WATER QUALITY

Nutrients, essential for plant growth, may be present in a form or an overabundant supply that cannot be used by plants. Excess nutrients that enter the surface or ground water may reduce water quality.

Phosphorus is an important nutrient necessary for plant growth. It is also the primary cause of algae and weed growth in lakes and ponds. The overabundance of decaying algae depletes the water oxygen supply and can kill fish and desirable vegetation. When phosphorus is applied as a fertilizer, it is quickly bound to soil particles or taken up by the plant. Therefore, the major sources of phosphorus in runoff into surface water are phosphorus bound to eroding soil particles or clippings and leaves that are left in streets and gutters, containing organic phosphorus.

Nitrogen is the nutrient that produces the greatest growth response in plants. Nitrogen is usually present in the soil as nitrate ions. Nitrate ions are soluble and not held by soil particles. Excess nitrate, not taken up by plants, will leach downward with percolating water and may enter the ground water supply.

Nitrogen is particularly dangerous to the very young. Infants less than six months old do not yet have stomach acid strong enough to prevent the growth of certain bacteria in their intestinal tract. Those bacteria convert nitrate to nitrite. Nitrites oxidize hemoglobin in the blood making it unable to carry oxygen. This condition is called methomoglobinemia or "blue baby syndrome." Without oxygen in the blood, brain damage or suffocation can occur. The allowable level of nitrogen in the water for infants under six months is 10 ppm (10 mg/l) as nitrate nitrogen or 1 ppm (1 mg/l) as nitrate. Older children and adults can probably tolerate much higher levels of nitrates but the primary drinking water standard has been set at the more conservative level.

Nitrate contamination is most commonly caused by over-application of nitrogen fertilizers, animal manures and improperly designed or installed septic tanks. Sandy, coarse-textured soils are most susceptible to nitrate pollution.

SOIL TESTING

Begin your safe fertilization practices by taking a soil test. Soil testing is a service provided by the University of Maine at Orono for a nominal fee. Soil tests kits can be obtained from your local Soil & Water Conservation District or your County

Extension Office. A soil test will tell you the levels of available phosphorus and potassium in the soil as well as the soil pH. Because nitrogen is so soluble, it is not useful to test for the level of nitrogen. To take a soil sample, follow the directions that come with your kit. A fertilizer recommendation will be included with your soil test results. If levels of phosphorus and potassium are sufficient, there is no need to apply those nutrients. The other important piece of information of your soil test results is the soil pH. Turf grasses grow best in a pH range from 6.0 to 7.0. In this range, nutrients are most available and microorganism populations necessary for decay are active. Most trees and shrubs grow best in a pH range from 5.0 to 7.0. A good compromise for landscapes that include trees, shrubs and turf is to maintain the pH between 5.5 and 6.5. To increase the pH, add lime, and to decrease the pH add elemental sulfur, aluminum sulfate or an acidifying fertilizer. Certain acid-loving plants such as azaleas and rhododendrons can be grown in beds that are maintained between 4.5 and 5.0. When the ground is covered and the soil stabilized by healthy turf, ground cover, shrubs or trees, soil runoff is greatly reduced. By maintaining the proper pH, you are helping to insure that the nutrients you apply will be taken up by your plants rather than lost by leaching or surface runoff.

- Take a soil test to determine the levels of phosphorus and potassium present in the soil.
- Maintain pH between 5.5 and 6.5 for most trees, shrubs, and turf.

TO AVOID PHOSPHORUS AND NITROGEN LOSS TO SURFACE AND GROUND WATER:

- Remove clippings and leaves from streets and gutters.
- Cover the soil with healthy plants or mulch to reduce soil erosion.
- Apply the proper amount of fertilizer. Don't overdo it.
- Be sure that all septic tanks are properly designed, installed and maintained.

FERTILIZER TYPES

Fertilizer can be purchased as "single ingredient" fertilizers – such as ammonium nitrate and urea for nitrogen, triple super phosphate for phosphorus, or muriate of potash for potassium. Combination fertilizers such as 10-10-10 or 5-10-10 include all three nutrients. The three figures of the fertilizer analysis represent the percentage of each element in the fertilizer. For example, a 5-10-10 fertilizer contains 5 percent nitrogen, 10 percent phosphorus (as P_2O_5) and 10 percent potassium (as K_2O). The 5-10-10 fertilizer is a 1-2-2 ratio, but it contains a greater percentage of each of the fertilizer elements. Smaller amounts of the 8-16-16 should be used in place of the 5-10-10.

Learn to read the fertilizer analysis – 5-10-10 fertilizer contains 5 percent nitrogen, 10 percent phosphorus and 10 percent potassium.

Fertilizers can also be classified by their solubility. Soluble fertilizers release their nutrients rapidly whereas organic and slow-release fertilizers release nutrients over a period of time. The fertilizer in the slow-release formulations is released by water penetration, weathering or microbial action, depending on the type of slow-release fertilizer. With one application of a soluble fertilizer, plants may not be able to take up all of the available fertilizer, and some nitrogen may leach below the plant rooting depth with percolating water. Slow-release fertilizers are designed to release at a rate more consistent with plant needs. Slow-release fertilizers are usually more expensive than soluble fertilizers. The choice of soluble or slow-release nitrogen depends on the reason for fertilization. Soluble fertilizer may be required when a quick response is desired and slow-release fertilizers are excellent for regular maintenance. Fertilizers are also formulated with a combination of soluble and slow-release nitrogen.

Use soluble fertilizers for a quick response.

Use slow-release fertilizers for regular maintenance.

Organic materials can be excellent sources of nutrients.

Be careful applying organic materials when the fertilizer analysis is unknown.

Remember that organic fertilizers are not necessarily beneficial to the environment or "safe."

Fertilizer is also available in dry and liquid forms. There is no difference in uptake from these forms. Both require irrigation or rainfall to distribute nutrients in the soil water solution so they are available for uptake.

ALTERNATIVE NUTRIENT SOURCES

Many organic materials provide excellent sources of nutrients. Release of nutrients from organic materials, applied in proper quantities, is usually slow so little nitrogen is leached from the soil (although some "raw manure" sources such as poultry manure are "fast release"). Composted sewage sludge, poultry manure, cow manure, composted leaves and other vegetation, peat moss, sea weed and fish emulsion are all organic sources of nutrients.

The problem with using organic materials as sources of nutrients is that the content of available nitrogen and other nutrients is often unknown. If you purchase packaged manure or composted sewage sludge at a garden supply store, the "total" fertilizer analysis should be on the package. This does not mean that all those nutrients will be "available" to the plants. The level of nutrients in unprocessed organic materials, bulk sources or organic material produced at home is anyone's guess. You may not apply enough fertilizer to get the desired result or you may over-fertilize, and nitrate leaching, salt toxicities, or excessive vegetative growth will occur. It is a common misconception that using organic fertilizers is beneficial to the environment and "safe." Organic fertilizers are safe if used properly but over-application can be just as detrimental to groundwater as over-application of inorganic fertilizers.

PURCHASING FERTILIZER

In order to make a decision about which fertilizer to purchase and how much to apply, it is important to know why you are fertilizing. For shade trees, you may want to promote rapid growth so that young trees quickly become large and functional. Or you may want to maintain the health and appearance of a mature tree. An additional reason for fertilization is to rescue a declining tree. Different amounts of fertilizer are required to fulfill each of these goals.

Before fertilizing your lawn, decide whether you would like to (1) promote a thick, lush, green lawn that requires a lot of maintenance; (2) maintain a healthy a persistent lawn with less mowing and maintenance needed; or (3) have a grassy area for erosion or ground cover requiring little upkeep.

The Plant Recommendation Chart gives general recommendations for fertilizer required for different plants under different circumstances.

PLANT RECOMMENDATION

SHADE TREES	
Promote growth	25.5 lb 18-6-12/1000 ft^2
Maintain mature tree	10 lb 18-6-12/1000 ft^2
Rescue declining tree	20.5 lb 18-6-12/1000 ft^2
CONIFERS	15 lb 18-6-12/1000 ft^2
SHRUBS	
Deciduous shrubs	$1/2$ cup (4 oz) 10-6-4/yd^2
Evergreens	$1/4$ cup (2 oz) 10-6-4/ yd^2
GROUND COVERS	3 lb 5-10-10/100 ft^2
PERENNIALS	
Early Spring	$1/2$ cup (4 oz) 5-10-10/yd^2
June	$1/4$ cup (2 oz) 5-10-10/yd^2
ANNUALS	
Before planting	1 cup (8 oz) 5-10-10/yd^2
After first planting	1-2 tablespoons/plant
VEGETABLES	
Before planting	2 lb 10-10-10/100 ft^2
At transplanting	$1/2$ cup (4 oz) 10-10-10/plant
Side-dressing	$1/2$ cup (4 oz) 10-10-10/plant
LAWNS	
Before planting	5 lb 12-4-8/1000 ft^2
March-April	5-10 lb 12-4-8/1000 ft^2
Sept – Oct	15-20 lb 12-4-8/1000 ft^2
(apply as split application)	