TURFGRASS MAINTENANCE FERTILIZATION

With grateful acknowledgement to The Pennsylvania State University, Extension Service, University Park, Pennsylvania.

A regular lawn fertilization program is necessary if you expect to maintain good-quality Turf Pound for Pound, fertilization will do more to improve poor-quality Turf or maintain good-quality lawns than any other single management practice.

The best approach to the establishment of a regular fertilization program is to have a soil test made as a basis for the program. Soil testing service is available from The Pennsylvania State University Soil and Forage Testing Laboratory. Soil test mailing kits for this service may be obtained from your county agricultural extension office at a nominal cost. The soil sample is forwarded to the University. After the analysis is made, it will be returned to you with recommendations for fertilization.

Grass plants normally need nitrogen, phosphorus, and potassium (potash) in larger amounts than can be supplied naturally from the soil. Nitrogen is essential for vegetative growth and good green color as well as being a constituent of plant proteins, chlorophyll, amino acids, and other plant substances. Phosphorus is necessary for good root development and plays a role in many vital growth processes. Potassium is also required for physiological functions and promotes disease resistance and winter hardiness in grasses.

Fertilizer should be bought on a quality basis rather than on bag size. Value depends on the total amount of plant food contained in the bag and the source of the nitrogen-carrying portion of the fertilizer. Law requires that the total amount of plant nutrients be shown on the bag. Information on the bag may or may not indicate the source of nitrogen used; ask your dealer or county agent. If the fertilizer contains slow release nitrogen materials, the percent water insoluble nitrogen (W.I.N.) must be on the bag. If 35% or more of the total nitrogen is guaranteed to be water insoluble, you will be purchasing a quality lawn fertilizer.

Fertilizer Definitions

Complete Fertilizer—A complete fertilizer contains the three major fertilizer elements—nitrogen, phosphorus (phosphates), and potassium (potash).

Fertilizer Grade—A fertilizer grade is a designation of the percentages of nitrogen, available phosphate, and water soluble potash in the product. A 10-6-4 grade fertilizer contains 10% nitrogen, 6% available phosphates, and 4% water soluble potash. Thus an 80 pound bag of 10-6-4 would contain 8 pounds of nitrogen (10% of 80), 4.8 pounds of available phosphates (6% of 80), and 3.2 pounds of water soluble potash (4% of 80). Law requires that the grade be given on the container and always in the order of nitrogen, available phosphates, and water soluble potash.

Fertilizers Ratio—A fertilizer ratio indicates the relationship between the percentages of nitrogen, available phosphates, and water soluble potash found in fertilizer. A 10-5-5 grade contains twice as much nitrogen as available phosphates or water soluble potash and would have a 2-1-1 ratio. Grades of 16-8-8 and 20-10-10 would

also have a 2-1-1 ratio. A grade of 12-4-8 would have a 3-1-2 ratio. The simplest means of determining a ratio is to take the smallest number in the grade and divide it into each number of the grade.

Turf Type Fertilizer—A turf type fertilizer is normally defined as a complete fertilizer having an approximate 2-1-1 to 3-1-2 ratio, containing a minimum of 10% nitrogen, and having 35% or more of the total nitrogen as water insoluble nitrogen.

Lightweight Fertilizer—Lightweight fertilizers have the nutrients impregnated or carried on such materials as vermiculite, ground corn cobs, peat, composted garbage or trash, synthetic foams, and similar materials. They often have a higher nitrogen guarantee than normal weight fertilizers, and a given area can be treated with a smaller total weight of material. Many of these materials contain soluble (quickly available) rather than the more desirable insoluble (slowly available) nitrogen.

Liquid Fertilizer—Fertilizer nutrients carried in suspension or in water solution are termed liquid fertilizers. The value of these materials is based on the grade and the weight of the liquid rather than the fluid content. Law requires the weight to be on the container. The plant nutrient content may be calculated in the same manner as with dry fertilizers. If, for example, a gallon of 10-5-5 liquid fertilizer weighs 10.5 pounds, then that gallon would contain 1.05 pounds of nitrogen (10% of 10.5), .525 pounds of available phosphates (5% of 10.5), and .525 pounds of water soluble potash (5% of 10.5).

Water Insoluble Nitrogen

A fertilizer bag may carry the following label:

10-5-5
Guaranteed Analysis

Total Nitrogen	10%
4% Water Insoluble Nitrogen	
Available Phosphates	5%
Water Soluble Potash	5%

In the above label example, the 10% represents the total percentage of nitrogen contained in the bag, and the 4% represents the total percentage of nitrogen in the bag that is water insoluble. The percentage of the total nitrogen that is water insoluble must be calculated from this label information. This value can be obtained by dividing the percentage of water insoluble nitrogen indicated on the label by the total percentage of nitrogen contained in the bag (also indicated on the label) and multiplying by 100. In this case 4% ÷ 10% times 100, or 40%, of the total nitrogen is water insoluble. Thus, this fertilizer meets the requirements of a turf-grade fertilizer. If the grade were 20-10-10, having 4% water insoluble nitrogen in the bag, the percentage of the total nitrogen that is water insoluble would be 4% ÷ 20% times 100, or 20%, and the fertilizer would not meet the requirements.

Types Of Nitrogen

The ideal fertilizer program provides uniform growth over the entire growing season. The types of nitrogen-carrying materials in a fertilizer are very important in determining how such a program can be obtained. Basically, nitrogen materials are divided into two broad groups—quickly available and slowly available.

The quickly available materials are water-soluble, and the nitrogen is immediately available to the plants. Results are a sudden flush of growth and a rapid depletion (two to six weeks) of the available nitrogen. Thus, it will be necessary to make frequent light applications of these materials

in order to obtain uniform growth over a long period of time. Quickly available nitrogen material include ammonium sulfate, ammonium nitrate, nitrate of soda, ammonium phosphate, calcium nitrate, urea, and others.

Slowly available nitrogen materials release a major portion of their nitrogen over relatively long periods. These materials depend upon decomposition by soil microorganisms or hydrolysis to provide nitrogen in a form available to the plant. The activity of soil microorganisms is highly dependent upon soil moisture and temperature conditions. Under high temperatures and adequate moisture supply, microbial breakdown of these materials is accelerated. Under conditions of high temperature and low moisture or low temperatures the breakdown will be much slower. Materials dependent on hydrolysis for nitrogen release are relatively unaffected by temperature but are highly dependent upon adequate soil moisture. Within slowly available materials there are two general groups—natural organic materials and synthetic organic materials dependent on microbial decomposition, and synthetic organic materials dependent hydrolysis.

Natural organic materials include activated or processed sewage sludge, animal and vegetable tankage, manures, soybean meal, cottonseed meal, etc. Because these natural organic materials vary greatly in their chemical composition, there will be a wide variation in the rate of breakdown, although all of them will release their nitrogen at a slower rate than the quickly available nitrogen sources.

Ureaform compounds are synthetic materials made by the chemical union of urea and formaldehyde. Within a given ureaform material there is a series of chemical compounds with varying degrees of solubility and resistance to decomposition. As the soil bacteria decompose these materials, the more easily decomposed materials break down first, followed by each successive compound. Thus, a small amount of nitrogen is constantly being released over a relatively long period of time. This permits the user to apply heavy applications of these materials at rather infrequent intervals. *Care must be taken not to confuse urea (quickly available nitrogen) with ureaform (slowly available nitrogen).*

IBDU (isobutylidene diurea) is an example of a synthetic material that is dependent upon hydrolysis to release its nitrogen. IBDU has extremely low solubility in water. As it is relatively unaffected by temperature, it has the advantage of releasing nitrogen, provided adequate moisture is available, during periods of cool weather when microbial activity is limited. IBDU has also been shown to be more efficient (more of the nitrogen applied is recovered by the plant) than natural organic or ureaform nitrogen sources.

To be continued

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