Soil Test Frequently Asked Questions:

Q: How do I know how much fertilizer to use when looking at the bar graph?
A: Read the information below the bar graph under the heading "Recommendations". Fertilizer and lime recommendations are customized for your soil sample based on the lab results reported in the bar graph. Keep in mind that these fertilizer recommendations are on a per year basis. For vegetable gardens, we encourage splitting the fertilizer recommended into two or three applications during the growing season. Apply one-third to one-half of the fertilizer at planting and the remaining amounts three to four weeks apart.

Q: Why is Nitrogen not shown on the bar graph of the soil test report?
A: Nitrogen recommendations are not based on a routine soil analysis. This is due to the many climatic, chemical and biological factors that influence the amount of nitrogen present in a soil at any given time. Instead of a soil analysis, nitrogen recommendations are based on research results from field experiments to determine the best application rate to attain optimum growing conditions for selected crops. All soil test reports provide standardized annual nitrogen recommendations based on current research.

Q: I submitted a soil sample for a lawn or pasture, but the results provide two completely different recommendations. Which recommendation should I use?
A: These recommendations are broken down into two categories for "Establishment" and for "Maintenance" as noted in bold print at the bottom of the report. You should follow the for "Establishment" recommendation only if you are putting down new grass seed or sod. This fertilization program should be followed only for the first year of establishment. For lawns or pastures that are already established, you should follow the for "Maintenance" fertilizer recommendations.

Q: I can't find the exact fertilizer recommended at any local garden store. What can I use as a substitute on my lawn?
A: The soil test recommendations are guidelines, not absolute quantities. If you cannot find a fertilizer grade that matches the recommended ratio, use the fertilizer grade that is closest to that ratio. See our Extension publication, "The Basics of Turfgrass Fertilization" at the end of this document for more information. You can access a fertilizer conversion calculator at: http://aesl.ces.uga.edu/soil/fertcalc/

Q: I want to use an organic source of fertilizer instead of synthetic fertilizers. How do I convert the soil test recommendations to organic?
A: See the following online publication "How to Convert an Inorganic Fertilizer Recommendation to an Organic One":
http://extension.uga.edu/publications/files/pdf/C%20853_5.PDF

Q: I can't open the soil test report attached to this email. What should I do?
A: Acrobat Reader software must be installed on your computer to read our (.pdf) files. If you are unable to open this document, you can download the Adobe Reader software for free online at http://get.adobe.com/reader/

Q: What nutrients do plants need?
A: Out of the 18 nutrients known to be essential for plant growth, there are only three that are most often lacking in soils. These three nutrients are **nitrogen**, **phosphorus**, and **potassium**, and every fertilizer product sold is required to have a guaranteed analysis of these nutrients in that order. The three numbers on the bag represent what percent of the total bag weight contains these nutrients. For example, a 10-10-10 fertilizer contains 10% of each nutrient by bag weight. So what's in the rest of the bag? The remaining percentage is "filler" which enables you to apply the fertilizer evenly over a large area. Each of these nutrients may be needed in different amounts depending on the types of plants you are growing and how your soil has been treated previously. Of all the nutrients, nitrogen is the most limited and mobile in soils and must be reapplied annually.

Q: Why do plants need these nutrients?
A: The "up, down, all-around" catch phrase is a simple way to remember why plants need nitrogen, phosphorus, and potassium. Very simply, the nitrogen in fertilizers makes plants grow "up" with new leaves, shoot growth, and turning their leaves green. Phosphorus makes plant roots grow "down" and is important in establishing new plants or seeds. Phosphorus also improves the quality of flowers, fruits and vegetables. Potassium is an "all-around" important nutrient for plant growth, fruit development, and resistance to diseases and other plant stresses.

Q: Which fertilizer should I use?
A: The easiest way to determine which nutrients your soil is lacking is by taking a soil sample for testing. Soil tests provide recommendations on the fertilizers needed for ideal plant growth. Soil tests also determine your soil pH and how much lime to apply, if any is needed. Maintaining your soil pH is critical to making sure that the fertilizer you apply can actually be taken up by plants' roots, otherwise you are wasting your time and money on fertilizer! Applying the correct amount also protects the environment from being polluted by excess nutrients. Soil tests should be done once a year for the first few years after planting anything new. After you have a couple of test results to compare from year to year, you can more easily predict future fertilizer needs based on your soil type. Go to www.soiltest123.com for more information about soil testing or contact your local Extension office at 1-800-ASK-UGA1.

Q: Is more fertilizer better?
A: All fertilizer applications should be based on the amount of nitrogen applied since this is the most important nutrient. Nitrogen is also the easiest nutrient to misapply and excess nitrogen will increase over-growth, water demand, and plant susceptibility to insects and diseases. A good rule to follow is to never apply more than 1 pound of nitrogen per 1,000 square feet at any one application. To quickly determine this maximum rate, all you have to do is divide 100 by the first number on the fertilizer bag (percent nitrogen). The result is the number of pounds of that product you'll need to supply 1 pound of actual nitrogen per 1,000 square feet. For example, if you are using a 12-4-8 fertilizer, then divide 100/12 = 8.3 pounds. Therefore, 8.3 pounds of 12-4-8 fertilizer would provide exactly 1 pound of actual nitrogen over an area of 1,000 square feet. Depending on the plant's needs, this rate could be applied every 4 to 6 weeks during the growing season.

The Basics of Turfgrass Fertilization

Gil Landry, Jr., Extension Turf Specialist

A regular fertilization program is important to maintain healthy, attractive turf. It should include applying the correct type and amount of fertilizer at the right time. Proper fertilization is generally the most cost-effective practice to have a nice lawn. However, fertilization must be combined with proper mowing, watering and pest management for the best results.

Fertilizer Definition

A fertilizer grade or analysis is the percentages of nitrogen (N), phosphorus (P_2O_5) and potassium (K_2O) in the material. A 12-4-8 grade fertilizer contains 12 percent N, 4 percent P_2O_5 and 8 percent K_2O.

A fertilizer ratio is the ratio of the percentages of N, P_2O_5 and K_2O in the fertilizer. Examples of a 1-1-1 ratio fertilizer are 10-10-10 and 8-8-8. An example of a fertilizer with a 3-1-2 ratio is 12-4-8. To figure the ratio, take the smallest number in the grade and divide it into each number of the grade. For example, 4 is the smallest number in a 12-4-8 grade and it can be divided into 12, three times and into 8, two times for a 3-1-2 ratio; that is, 12-4-8 = 3-1-2.

The Fertilizer Label

Georgia law requires fertilizer producers to display the guaranteed analysis (grade) on the fertilizer container (Figure 1). The grade or analysis of this fertilizer is 16-4-8. The first number (16) represents the percent nitrogen (N); the second number (4) represents the percent phosphorus (P_2O_5); and the third number (8) represents the percent potassium (K_2O). The 50-pound bag of 16-4-8 fertilizer contains 8 pounds of nitrogen (50 x 0.16 = 8), 2 pounds of P_2O_5 (50 x 0.04 = 2), and 4 pounds of K_2O (50 x 0.08 = 4), for a total of 14 pounds of nutrients. The other 36 pounds of material in the bag is called filler or carrier.

16-4-8	
Guaranteed Analysis	
Total Nitrogen	16%
4% Water Insoluble Nitrogen	4%
Available Phosphates	4%
Water Soluble Potash	8%
Net Weight 50 lbs.	

Figure 1. Fertilizer Label

Choose fertilizer for the total amount of nutrients in the container and the source of nitrogen. As with many other products, the smaller the package, generally, the more the cost per pound of fertilizer.

Fertilizer Recommendations And Calculations

Turfgrass fertilizer recommendations are given in pounds of nitrogen (N), phosphorus (P_2O_5) and potassium (K_2O) per 1000 square feet of area. An example of a common grade of fertilizer and the amount needed to meet the recommendations is also provided.

Many different grades of fertilizer are available that can be used to meet these soil test recommendations. **Remember: The soil test recommendations are guidelines, not absolute quantities. If you cannot find a fertilizer grade that matches the recommended ratio, use the fertilizer grade that is closest to it.**

Table 1 (page 2) lists the most commonly recommended lawn fertilizer ratios and at least one example of a fertilizer grade for each ratio. The pounds of the fertilizer needed to apply one pound of nitrogen per 1000 square feet and the pounds of P_2O_5 and K_2O being ap-plied are also listed for each fertilizer ratio and grade. Fertilizers of the same ratio can be substituted for each other. For example, 10 pounds of 10-10-10 can be used for 12 pounds of 8-8-8 and both will supply 1 pound of N, P_2O_5 and K_2O.

To determine how many pounds of fertilizer it would take to supply one pound of nitrogen to a 1,000 square-foot area, divide the percent nitrogen of the fertilizer into 100. (NOTE: This is only true when working on a 1000 square-foot basis).

Examples: How many pounds (1) 34-0-0 or (2) 12-4-8 are needed to apply 1 pound of nitrogen per 1000 square feet?

(1) 100/34 = 3 pounds of 34-0-0
(2) 100/12 - 8.3 pounds of 12-4-8

The application rates can be changed for a 10,000 square-foot area, an acre or any size area. **Example:** It takes 8.3 pounds of 12-4-8 to supply one pound of nitrogen to a 1000 square-foot area. So, 8.3 x 10 = 83 pounds of 12-4-8 are needed to supply 1 pound of nitrogen to a 10,000 square-foot area. Since there are 43,560 square feet in an acre, multiply 8.3 x 43.6 to get 362 pounds of 12-4-8 to supply 1 pound of nitrogen to an acre.

Table 1. The Most Commonly Recommended Fertilizer Ratios for Lawns, Example Fertilizer Grades and Application Rates

Fertilizer Ratio	Example Fertilizer Grade	Lbs. needed to apply 1 lb. N per 1000 sq.ft.	Lbs. applied with 1 lb. N	
			P_2O_5	K_2O
1-1-1	8-8-8	12	1.00	1.00
1-1-1	10-10-10	10	1.00	1.00
1-2-3	5-10-15	20	2.00	3.00
1-2-3	7-14-21	14	2.00	3.00
1-2-2	6-12-12	17	2.00	2.00
1-2-2	5-10-10	20	2.00	2.00
3-1-2	12-4-8	8	0.30	0.60
4-1-2	16-4-8	6	0.25	0.50
1-0-1	15-0-15	7	0	1.00
1-0-0	34-0-0	3	0	0

If substituting complete fertilizers of different rations, base the application rate on the amount of fertilizer needed to supply the recommended quantity of nitrogen. Therefore, from Table 1, 6 pounds of 16-4-8 can be substituted for eight pounds of 12-4-8 or vice versa. Proper substitutions of other materials can also be calculated as shown before. When substituting fertilizers, remember to select a fertilizer grade that most nearly matches the grade recommended.

Nitrogen Source

Nitrogen materials can be divided into two groups. One is "quickly available" or "water soluble," and the second is "slowly available," "water insoluble," or "controlled-release." The quickly available nitrogen is immediately available to plants provided there is adequate soil moisture. In addition, these materials generally (1) are less expensive, (2) can cause growth flushed, (3) have short soil residual, (4) can leach and (5) have high burn potential. Quickly available nitrogen materials include ammonium nitrate, urea, ammonium sulfate and potassium nitrate.

Slowly available materials release nitrogen more gradually and over a longer period. The rate of nitrogen release depends on microbial decomposition alone or physical and/or chemical processes along with microbial activity. Environmental factors that affect microbial activity and release of these fertilizers most are temperature and moisture. High temperature and moisture increase microbial activity and nitrogen release. The slowly available materials generally (1) are more expensive, (2) require fewer applications, (3) reduce losses to leaching and (4) have low burn potential. Examples of slowly available materials include sewage sludge, ureaformaldehyde (UF) [Don't confuse with urea, which is a fast release material], methylene urea, isobutylidine diurea (IBDU) and sulfur-coated urea (SCU).

Slowly available nitrogen is usually identified on the label as "water insoluble nitrogen" (WIN), UF, IBDU or SCU. The 16 percent nitrogen in Figure 1 (page 1) represents the total percentage of nitrogen in the bag. The percentage of the total nitrogen that is water insoluble can be calculated by dividing the percentage of water insoluble nitrogen by the total percentage of nitrogen and multiplying by 100. Thus, 4 percent divided by 16 per-cent x 100 = 25 percent of the total nitrogen is water insoluble or slowly available. A high quality, slow release lawn fertilizer should contain at least 30 percent of the nitrogen in a slow release form. If slow release nitrogen is present in the fertilizer, Table 1 may be used in the absence of the manufacturer's recommendations. If 50 percent or more of the nitrogen is in the slow release form, apply twice the recommended amount of nitrogen half as often.

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