

The Basics of Turfgrass Fertilization



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A regular fertilization program is important to maintain a 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 ($50 \times 0.16 = 8$), 2 pounds of P_2O_5 ($50 \times 0.04 = 2$), and 4 pounds of K_2O ($50 \times 0.08 = 4$), 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 applied 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, $8.3 \times 10 = 83$ 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 8.3×43.6 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 ₂ O ₅	K ₂ O
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 expen-

sive, (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, isobutylidene 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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