Fact Sheet 94-64

Turf Fertilization at Lake Tahoe

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Introduction

A lush, dark green lawn is often something a homeowner takes pride in, and can make a home stand out in a neighborhood. However, in the quest for an award winning lawn, homeowners often overfertilize which can cause problems for the lawn, and can stimulate algae growth in nearby streams and lakes, degrading the water. This fact sheet explains proper turf fertilization practices which will produce healthy, attractive lawns and protect the exceptional waters of Lake Tahoe. For additional and more general information on fertilizers at Lake Tahoe, see "Using Fertilizers Properly," fact sheet 94-11.

Turfgrasses need proper nutrition to stay healthy. In poor soils lawn is yellow, grows sparsely, and is susceptible to invasion bywords. However, applying too much fertilizer, or applying it at the wrong time of year leads to turf with excessive thatch, low drought tolerance, and a greater susceptibility to insects and diseases, increasing the potential for water pollution. Proper fertilizer application improves lawns and protects the environment.

Recent research results have changed fertilizer recommendations. Timing of fertilization has been shown to be more important than the amount of fertilizer applied and less fertilizer than previously thought necessary is better. Fertilizers should be applied to turfgrasses only in the spring and fall.

Timing is important because it is related to how grass grows. Early spring and fall is the optimum time for root growth, when soil temperatures are 50^{o} to 65^{o} F.

Fertilization in the fall when the average daily temperature is below 50^{o} F will promote a vigorous, healthy root system and a hardier crown. (see figure 1). Add the day's high and low temperatures and divide by two to determine the average daily temperature. This will keep the grass green longer into the fall, without excessive top growth. The healthier root system will give a quicker "greenup" in the spring without the need for an early spring application. Then, an early June application is all that is needed to supply the turfs needs through the summer.

Grass leaves grow most when daytime temperatures are between 60-75^{o} F. Fertilization during this period causes a dramatic increase in leaf growth. Not only does this increase the frequency of mowing required, but it also increases the amount of carbohydrate available to the leaves. Overfertilization with nitrogen results in new leaf growth that is very soft, making the plant more susceptible to heat and drought stress, and increased disease and insect attack.

What Kind of Fertilizer

Turfgrass fertilizers are generally high in nitrogen (N) and lower in phosphorus (P) and potassium (K). The percentage (by weight) of each of these nutrients is indicated on the label by a formula, three numbers, separated by dashes. The numbers represent the percent N-P-K, always in that order (see figure 2). Fertilizers containing all three nutrients are called "complete" fertilizers because N. P. and K are the three nutrients needed in the largest quantities by plants. Turf uses more (N) and K than it does P.

Phosphorus fertilization is particularly important during the establishment of a lawn, whether by sod or seed. It encourages strong root growth and proper plant development.

Nitrogen fertilizers are of two general types, fast and stow release. In the Tahoe Basin, the preferred fertilizer type is slow release because it is less likely to pollute streams and the Lake, stimulating unsightly algae growth.

Depending on the amount of slow release N in the fertilizer, open shown as WIN (Water Insoluble Nitrogen) on the label, a fertilizer can be classified as slow (>30% WIN), medium (15-30% WIN), or fast (<15% WIN) release. The fertilizer shown in Figure 2 contains 20% total N. and 3.2% WIN. To determine whether this is a slow, medium or fast release fertilizer, divide the WIN by the total N. 3.220 = 0.16 or 16%. Therefore, this is a medium release fertilizer.

How Much Fertilizer

Turfgrasses in the Tahoe Basin should be fertilized spring and fall at the rate of 1 lb. of actual nitrogen for each 1000 square feet. Applications at greater rates can have harmful side effects to the grass and to local water resources. To fertilize at this rate, some simple calculations are required. It is necessary to know: (1) the area (square feet) of the turf to be fertilized, and (2) how many pounds of fertilizer are needed to get the actual rate of one lb. of N per 1,000 square feet.

First, calculate the area of the lawn. This would be very simple if all turf areas were a common geometric shape. However, not many are. An easy way around this problem is to divide the turf area up into sections which approximate a square, rectangle, or a triangle. Then calculate the individual areas and add them up.

1. Calculate the square footage of turf to be fertilized:

Area "A" 30' x 20' = 600 sq. ft.

Area "B" 1/2 x 16' x 12' = 96 sq. ft.

TOTAL 696 sq. ft.

2. Calculate the amount of fertilizer needed to get 1 lb. of actual N.

Formula on fertilizer bag: 24-4-12.

Divide the 1 lb. of N needed by percent N shown in formula:
1 lb 0.24 = 4 lb. of fertilizer contain 1 lb. of N. This amount is the amount of fertilizer needed to fertilize 1,000 sq. ft. of turf with one lb. of actual nitrogen.

3. Calculate the amount of fertilizer needed to apply N at the recommended rate of 1 lb. per 1,000 sq. ft. to the turf area calculated in #1 above.

3a. Turf Area Ratio (TAR) =

$$\frac{\text{Actual turf area}}{\text{Reference turf area}} = \frac{696 \text{ sq. ft.}}{1{,}000 \text{ sq. ft.}} = 0.7$$

3b. (TAR) x (fert. needed for 1,000 sq. ft.) =

0.7 x 4 lb. = 2.8 lb.

which can be rounded to	3 lb.

Next, figure out how much fertilizer is needed for the area. For this calculation, the square feet of turf area already calculated, and the formula on the fertilizer label are all that are needed. Using the example above, 696 square feet will be fertilized with a, 24-4-12 fertilizer. First calculate how many pounds of fertilizer are needed to apply one pound of actual nitrogen (N) per 1,000 square feet. Simply divide the 1 lb. of N needed, by the percent N in the fertilizer.

One pound of actual N equals 4.17 lb. of 24-4-12 fertilizer, or approximately 4 lb. Since the area to be fertilized is not 1,000 square feet, but is 696 square feet, less than one pound of actual N is needed. Dividing the area to be fertilized by 1,000 gives the turf area ratio which is then multiplied by the amount of fertilizer needed for 1,000 square feet. So, to apply N at the recommended rate of 1 lb. per 1,000 square feet, approximately three pounds of 24-4-12 fertilizer is needed for a 696 square foot turf area.

How To Apply Fertilizer

Turf fertilizers can be sprayed on as a liquid or broadcast as granules. If using liquid fertilizers, carefully read the directions on both the sprayer and fertilizer to make sure the correct amount is used. Liquid fertilizers are water soluble and not slow release. Some liquid fertilizers come premixed in a container that apaches directly to the garden hose. It is difficult to calculate how much to apply in order to achieve recommended rate of N per 1,000 square feet.

Granular fertilizers are easier to apply evenly to lawns and require less time. They can be broadcast by hand, which makes it difficult to get even coverage, or a drop spreader or a broadcast spreader (the easiest way). Whichever method is used, it is important to make sure only the grass gets the fertilizer. Do not fertilize areas located next to stream environment zones or roadside ditches. Any fertilizer that ends upon driveways, sidewalks or other unguarded areas should be swept onto the turf. Fertilizers need to reach the plant roots in order to be used. Therefore, any application should be immediately followed by alight irrigation which will not cause runoff, but will soak into the soil to a depth of two to three inches.

Because fertilizers act as "food" for unsightly algae, their use is prohibited in shorezone areas and within 25 feet of streams. Fertilizer use should also be avoided in other stream environment zones (SEZ) like meadows, marshes and similar areas influenced by the presence of water.

Turf Maintenance

The way turf is cared for will also influence the need for fertilizers. If the clippings are not removed after mowing, they will decompose and return the nutrients stored in the leaves to the soil, decreasing the need for fertilization. Leaf clippings can supply up to 20% of the required N over the year, and should be enough to keep the grass healthy and reasonably green all summer. If there appears to be excessive yellowing during the summer, the turf can be fertilized with iron.

Mowing also effects the plant's use of fertilizer. If the lawn is scalped, the root system

suffers as carbohydrates in the roots are used for new leaf growth. If the grass is fertilized after scalping, carbohydrates stored in the roots are reduced even more. This make the grass susceptible to drought, insects and disease. Maintain turf at a height of 2 inches for bluegrass and 2.5 to 3 inches for turf-type tall fescues. Mow when the grass grows one third higher. The resulting deep roots will improve the efficiency of the fertilizer and reduce pollution to ground water and eventually the Lake.

Turf Types

The green color of grasses differs between species and varieties. Some grasses are inherently less green than others and no amount of fertilizer will change their color. For example, 'Kentucky 31' is a fescue variety that is yellow-green no matter how much nitrogen it receives. 'Bonsai', also a fescue, has a deep green color even when low amounts of nitrogen are used. The same holds true for bluegrass. The variety 'Midnight' is rated consistently dark green, as is 'Baron', even when grown under low maintenance conditions without additional, or reduced, nitrogen fertilizer. These bluegrass varieties do not require anymore nitrogen to stay green than the fescues listed above. Careful selection of turfgrass varieties can do much for keeping turf areas green. Table 1 below lists some common turfgrass varieties and their color ratings.

Table 1. Color Ratings for Low Maintenance Turf Varieties

Turf Type	Dark Green	Color Rating Medium	Poor
Blue Grass	'Midnight' 'Merit' 'Baron' 'Ram-1'	'Kenblue' 'Banjo' 'Amazon' 'Freedom'	'Park' 'Monopoly' 'Merion' 'Suffolk'
Turftype Tall Fescue	'Vegas' 'Bonsai' 'Olympic II' 'Aztec'	'Olympic' 'Jaguar II' 'Rebel II' 'Sundance'	'Kentucky 31' 'Arid' 'Finelawn 1' 'Rebel'
Fineleaf-Fescues (good for shaded areas)			
Creeping Red	'Flyer' 'Jasper'	'Sunset' 'Talus'	'Vista' 'Herald'
Chewings Fescue	'Shadow' Southport' 'Jamestown'	'Profomer' 'Scarlet' 'Tiffany'	'Epsom' 'Barrica' 'Rainbow'

These represent only a few of the varieties available. A good fertilization program promotes healthy turfgrass that is resistant to insects and diseases, while reducing pollution to nearby waters. However, improper use of fertilizers can damage plants and pollute lakes and streams. By understanding and following the information in this fact sheet, a healthy, attractive lawn is possible, while protecting Lake Tahoe's world renowned clarity. For more information on soil testing, fertilization and turfgrass varieties, call the University of Nevada Cooperative Extension at 784-4848 or 832-4150, or contact the USDA Soil Conservation Service.

*BMP stands for Best Management Practices. BMPs are land use practices designed to prevent or minimize water quality problems. This BMP is from the Tahoe Regional Planning Agency's Handbook *of Best Management Practices.*

References