Southern Idaho Lawns

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Lawns require adequate levels of plant nutrients throughout the growing season to maintain healthy, vigorous growth. Use of fertilizer is one of several important management practices for establishing and maintaining a beautiful lawn.

To fertilize your lawn correctly, you need to understand its nutrient needs. Lawns in southern Idaho often need four macronutrients: nitrogen (N), phosphorus (P), potassium (K), and sulfur (S). In many areas of southern Idaho lawns may also require the addition of iron (Fe) for optimum growth.

Macronutrients

Nitrogen (N)

Nitrogen helps grasses produce healthy, lush blades. Southern Idaho lawns need 3 to 5 pounds of actual N per 1,000 square feet each year. The exact amount you apply depends on your soil type, your choice of fertilizer, and the number of months your lawn is actively growing. Avoid over-application of N because it increases the potential for nitrate (NO_3^-) leaching. Nitrates that leach through soils and reach groundwater (aquifer) pose a threat to human health.

Two kinds of N fertilizers are available commercially: slow release and quick release. Slow release fertilizers become available slowly. Use them in sandy soils, in soils that drain rapidly, in soils that receive excessive watering, or when grass plants are growing slowly (very early spring and late fall). Slow release N fertilizers are often referred to as WIN (water insoluble nitrogen) materials. You can tell if a material is slow release by reading the information on a fertilizer bag.

Quick release fertilizers provide readily available N to plants. Quick release fertilizers (e.g., ammonium sulfate, ammonium nitrate, urea, potassium nitrate) are best to use when the grass is rapidly growing in the late spring and early summer.

Phosphorus (P)

Phosphorus promotes strong root growth and encourages lawns to thicken quickly. Phosphorus will not move appreciably with irrigation water and will not cause leaf burning or plant injury. Phosphorus fertilizer applications may, therefore, be made at one time. Phosphorus may also encourage weed growth (dandelions) if applied to the surface of the grass or soil.

Potassium (K)

Adequate K is necessary for disease resistance. This element also helps the lawn to stand up to heavy traffic and promotes winter hardiness. Potassium is usually present in adequate quantities in lawns in southern Idaho. Avoid over-applications because too much K can result in the accumulation of salts in soils.

Sulfur (S)

Sulfur is essential for developing and maintaining an attractive, deep green color in lawns. Rapidly growing, intensively managed lawns

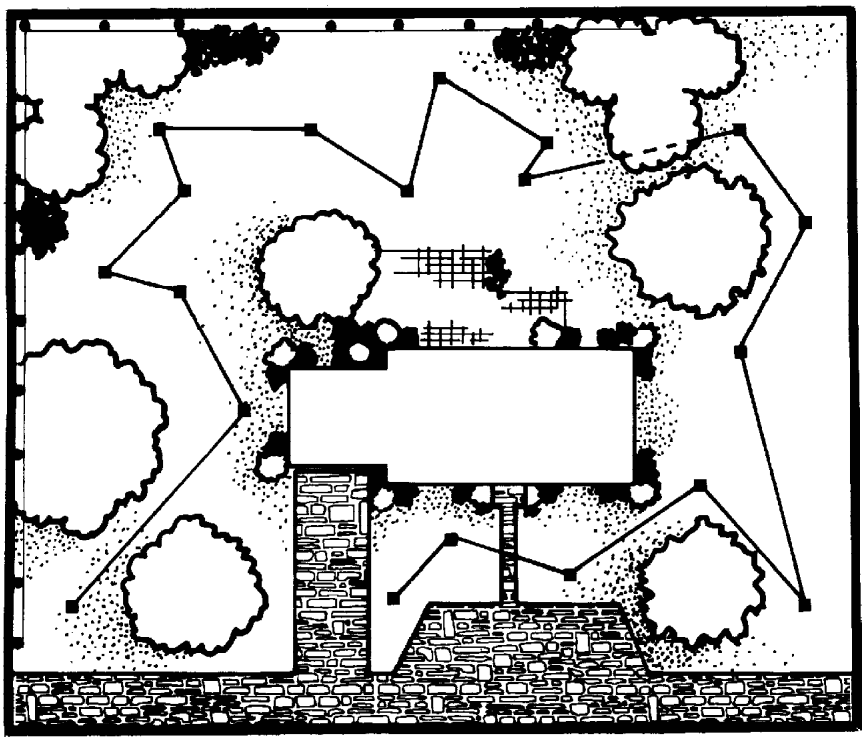

Fig. 1.
Collect samples from 15 to 20 locations, using a zig-zag pattern. Stay away from unusual areas, yard edges, and tree canopies. (■ = spots where samples are collected.)

have a high demand for S. Fortunately, most water sources in southern Idaho contain adequate levels of S.

Iron (Fe)

Iron (Fe) deficiency (iron chlorosis) is common in lawns of southern Idaho due to high soil pH levels. The primary symptom is yellowing of new growth. Inorganic iron salts (e.g., ferrous or iron sulfate) can be applied yearly to established lawns because of the low Fe content in the soil. Iron chelates (Fe-DTPA, Fe-EDTA, Fe-EDDHA, and Fe-HEDTA), however, are the most effective for a soil-applied material. Liquid applications of iron can be sprayed on the lawn with a fairly quick plant response, but generally repeated applications are required.

Fertilization Strategies

Lawns in southern Idaho can be fertilized by following one of two strategies: soil testing or nutrient ratios. In one, fertilizer rates for the lawn are based on a laboratory analysis of a soil sample. The other is based on the fact that lawns do best when fertilized with a fertilizer having a 3:1:2:1 ratio of N, P, K, and S. The University of Idaho recommends that you have a soil test done on your lawn every 10 years. The 10-year soil sample will give you base line pH and organic matter information. We recommend that you base your N, P, K, and S fertilization strategy on nutrient ratios (described below) in the nine out of 10 years that a soil sample is not collected.

Soil Testing Strategy

Soil tests can provide valuable information about the availability of plant nutrients for plant growth. You should test the soil before establishing new lawns and again every 10 years after the lawn is established. Take the soil samples before you apply current-season applications of fertilizers or soil amendments.

Follow these guidelines to obtain a representative soil sample from your yard:

Depth of Sample—When establishing a lawn or for existing lawns, sample the soil to a depth of 8 inches.

Equipment—Collect the soil sample in a clean plastic container such as a bucket. You can use a small spade, or soil sampling probe (1/2 to 3/4 inch in diameter) to sample the soil before the grass is established. The soil sampling probe works best when sampling established turf. Be sure that fertilizer materials are kept away from the sampling equipment.

Number of Cores—Randomly collect and mix 15 to 20 cores from a relatively uniform area to be fertilized. Keep these sample cores separate from sample cores taken from non-representative areas (e.g., flower beds, vegetable gardens, etc.). Avoid unusual areas (e.g., areas

where compost may have been piled, areas with drainage problems, areas where trash may have been burned, areas where fertilizer may have been spilled, etc.) when taking cores. Sample these areas separately so that they can be properly treated.

Use a zig-zag pattern when taking soil samples (Fig. 1) so that your sample will be representative of your entire lawn. Combine the cores from the sampled areas to make a composite sample. Hand mix the soil thoroughly in the container. For more information on how to collect and process a soil sample, see University of Idaho Bulletin 704, *Soil Sampling*.

Ordering the Soil Test—Place about 2 cups of the mixed soil in a soil sample bag. Be sure to include your name, date, and sampling location on the soil sample bag. Complete the information sheet required by the soil testing laboratory, and mail the sample and information sheet to the soil testing laboratory. If you need information about private and/or public soil testing laboratories, contact your local University of Idaho county extension office.

Request the soil testing laboratory analyze your sample for organic matter content, soil pH, nitrate-N (NO_3-N), ammonium-N (NH_4-N), phosphorus (P), potassium (K), sulfur (S), and electrical conductivity (EC). Both pH and EC are normally provided in the laboratory's routine analysis.

Fertilizer Rates Based on Soil Test Information

Existing Lawns

Fertilizer guidelines are given in actual amounts of N, P_2O_5, K_2O, and S. Fertilizer rates are expressed in pounds of nutrient per 1,000 square feet (ft^2).

Nitrogen—Determine the N application rate based on the soil for organic matter content (Table 1).

Table 1. Nitrogen application rate based on a soil test for organic matter content (soil sample comes from the surface 8 inches of your lawn's soil).

Soil test Organic matter	N supplying power of soil	Application rate per 1,000 ft^2
(%)		(lb N)
5 or higher	High	1
3 to 5	Moderate	2
2 to 3	Average	3
1 to 2	Low	4
under 1	Very low	5

Phosphorus—Determine the P application rate per 1,000 square feet of lawn based on a P soil test (Table 2).

Table 2. Phosphorus application rate based on a soil test (soil sample comes from the surface 8 inches of your lawn's soil).

Soil test P ($NaHCO_3$)*	P-supplying power of soil	Application rate per 1,000 ft^2	
		Existing lawn	New lawn
(ppm)		(lb phosphate P_2O_5)	
15 or higher	High	None	None
11 to 15	Moderate	1	2
6 to 11	Low	2	3
0 to 6	Very low	3	4

* Note: Soil test laboratory should use sodium bicarbonate ($NaHCO_3$) as the soil test extractant for phosphorus.

Potassium—Determine the K application rate per 1,000 square feet of lawn based on a K soil test (Table 3).

Table 3. Potassium application rate based on a soil test (soil sample comes from the surface 8 inches of your lawn's soil).

Soil test K	K-supplying power of soil	Application rate per 1,000 ft^2	
		Existing lawn	New lawn
(ppm)		(lb potash K_2O)	
250 or higher	Very high	None	None
150 to 250	High	1	2
100 to 150	Moderate	2	3
50 to 100	Low	3	4
under 50	Very low	4	5

Sulfur—Apply S if your soil contains less than 10 parts per million (ppm) SO_4-S. An application rate of 1 pound S per 1,000 square feet should be adequate for the entire year.

Establishing a New Lawn

When establishing a new lawn, we recommend a soil test for plant available nitrogen. Soil tests provide values for both ammonium-N and nitrate-N. When added together they equal the total plant available nitrogen. If your soil test indicates that there is less than 5.0 ppm plant available N in the top 8 inches of the soil, apply 0.5 pound N per 1,000 square feet. If the soil test from your soil sample indicates 5.0 ppm plant available N or more, additional N is unnecessary to establish the new lawn.

New lawns generally require greater additions of P and K than existing lawns. Phosphorus application rates based on a soil test are shown in Table 2. For best results when establishing new lawns, incorporate the fertilizer P into the top 4 to 6 inches of the soil before seeding the lawn.

Potassium application rates based on a soil test are shown in Table 3. As with P, for best results incorporate the K fertilizer into the top 4 to 6 inches of the soil before seeding the lawn.

Apply S fertilizer to the soil if your soil test value indicates less than 10 ppm SO_4-S. An application rate of 1.5 pounds S per 1,000 square feet is recommended. If you are laying sod instead of seeding, gypsum (calcium sulfate) applied at the rate of 1.5 pounds per 1,000 square feet to the soil surface will enhance rooting.

Fertilizer Rates Based on Nutrient Ratio Strategy

The fertilization strategy based on nutrient ratios involves applying 0.5 pound of N per 1,000 square feet of lawn for each month of active grass growth rather than relying on a soil test. (When daily temperatures average above 85 degrees F, most grasses become inactive and stop growing unless you water them.) Most lawns in southwestern Idaho start active growth in late February or early March and often continue to grow until mid-November. As you move east of southwestern Idaho the active growing season is reduced. If, for example, your lawn grows actively for 9 months each year, you would apply 4.5 pounds of N per 1,000 square feet over the year (9 x 0.5 = 4.5).

Phosphorus, K, and S applications are based on a ratio of those nutrients to the amount of N applied: three parts N, to one part P, to two parts K, to 1 part S. Thus, if the N recommendation is 4 pounds per 1,000 square feet, the P recommendation would be 1.3 pounds, the K recommendation would be 2.6 pounds, and the S recommendation would be 1.3 pounds.

Let's say that you have a lawn that is actively growing 9 months each year. You would calculate N, P, K, and S fertilizer needs as follows:

0.5 lb N per 1,000 ft^2 per month x
9 months = 4.5 lb N per 1,000 ft^2

3 parts N = 4.5 lb N
1 part P = 1.5 lb P
2 parts K = 3.0 lb K
1 part S = 1.5 lb S

You would buy a lawn fertilizer with a N:P_2O_5:K_2O:S ratio of 3:1:2:1 and apply as directed under the "When to Apply Fertilizer" section. Because you may not be able to obtain a fertilizer with a 3:1:2:1 ratio exactly, select a fertilizer with a ratio as close to it as possible.

When to Apply Fertilizer

Apply the recommended amount of fertilizer in four applications: one-fourth in early May, one-fourth in June, one-fourth in early September, and one-fourth in October or November.

For example, if you need 4 pounds of N per 1,000 square feet, you would apply it as follows:

1.0 lb N in early May
1.0 lb N in June
1.0 lb N in early September
1.0 lb N in late October/early November

Do not apply more than 1 pound N per 1,000 square feet at one time unless you are using a slow release fertilizer. When using a slow release fertilizer you can apply as much as 1.5 pounds of N per 1,000 square feet at one time.

Using Formulated Lawn Fertilizers

Most commercial lawn fertilizers are mixtures of fertilizer materials. Fertilizers containing the three major nutrients (N, P, and K) are referred to as complete fertilizers. By law, manufacturers are required to list major nutrients on the fertilizer bag in the percentage form of N:P_2O_5:K_2O. A fertilizer bag containing a 20-30-5 fertilizer has 20 percent N, 30 percent P_2O_5, and 5 percent K_2O.

If secondary and micronutrients are present in the mix it will also list these in percentages. For example ammonium sulfate may be listed as 21-0-0-24S. This fertilizer would contain 21 percent N, 0 percent P_2O_5, 0 percent K_2O, and 24 percent sulfur (S). Examples of commercial and organic fertilizers are shown in Table 4.

Fertilizer recommendations for lawns are normally expressed as pounds of N, P_2O_5, and K_2O per 1,000 square feet. Here is how to calculate the amount of fertilizer material needed to obtain the recommended application of a given nutrient:

$$\text{Pounds fertilizer material to apply per 1,000 ft}^2 = \frac{(\text{lb nutrient desired/ 1,000 ft}_2) \times 100}{\text{Nutrient analysis of fertilizer material}}$$

For example, if the soil test results call for the addition of 1 pound P_2O_5 per 1,000 square feet and the fertilizer material used contains 12 percent P_2O_5 (e.g., 24-12-6 analysis), then you would compute the amount of fertilizer to apply per 1,000 square feet as follows:

$$\text{Pounds fertilizer material to apply per 1,000 ft}^2 = \frac{(1 \text{ lb } P_2O_5/1{,}000 \text{ ft}^2) \times 100}{12}$$

$$= \frac{1 \times 100}{12} = 8.3 \text{ lb of 24-12-6/1,000 ft}^2$$

In addition to supplying 1 pound P_2O_5, these 8.3 pounds of the 24-12-6 fertilizer mix will also supply 2 pounds of N and 0.5 pound of K_2O per 1,000 square feet. Because of the amounts of N and K to be applied, you should (1) divide the fertilizer in half and make two applications of 4.15 pounds each (one application in May and one application in early September) or (2) divide the fertilizer needed by 4 and make four applications of 2.075 pounds each (May, June, September, and November).

Other Considerations

Lime Applications

Lawns rarely respond to liming if the soil pH is greater than 5.1. Lime is only used on very acid soils (low pH), when it is necessary to raise the soil pH to a more desirable level (pH 5.6 to 7.0), which promotes growth and enhances plant nutrient availability. Overliming or applications of lime when unneeded can tie up nutrients in forms plants cannot use and so cause nutrient deficiencies. Generally, soils in southern Idaho contain enough lime, so liming is unnecessary. Turfgrass grown on areas constructed from sand or synthetic materials (golf greens or sports fields) may require occasional liming.

Caution: Apply lime only when soil test results indicate a soil pH value of less than 5.1. Consult your University of Idaho county extension educator for the rate of lime needed.

Gypsum Applications

Sometimes gypsum is incorrectly recommended as an acid to lower soil pH or as a cure for soils with a high clay content. Gypsum is not an acid-forming material, nor will it alter the soil pH unless the soil pH is greater than 8.3, which usually means the soil is high in exchangeable sodium. Typical nutritional application rates of 1 to 2 pounds gypsum per 1,000 square feet on established lawns will not affect soil pH. Gypsum will not reduce the adverse impact of high clay content either.

Most soils high in exchangeable calcium (Ca), which includes nearly all soils in southern Idaho, are friable and easily tilled and usually will permit water to penetrate readily.

Gypsum applications to these soils fail to enhance friability or appreciably affect soil tilth.

Excess Salts

Excess soil salts affect grass growth by reducing the amount of water the grass plants can take from the soil. Excessive salt levels in the soil cause poor germination and stand establishment in new lawns and poor or no grass growth in established lawns. High salt levels are often associated with one or more of the following conditions: high water tables, inadequate drainage, use of irrigation water high in salts, high sodium levels in the soil, and excessive application rates of inorganic or organic fertilizer materials.

Electrical conductivity (EC) is an indirect measure of the salt content in the soil. When a soil test indicates an EC reading greater than 4.0 mmohs/cm, improved drainage and extra irrigation may be needed. Soils high in exchangeable sodium require specific reclamation procedures. For additional information, see University of Idaho Bulletin 703, *Salt- and Sodium-Affected Soils*.

Other Micronutrients

With the exception of iron (Fe), micronutrients are not generally needed for lawns in southern Idaho. Iron deficiency symptoms—chlorosis or the yellowing of new growth—are common in lawns in southern Idaho. Iron deficiencies can be corrected by the methods outlined earlier in this publication.

Table 4. Fertilizer material required to supply 1 pound of plant nutrient per 1,000 square feet.

	Fertilizer analysis*				Pounds of material needed to supply 1 lb of nutrient			
	N	P_2O_5	K_2O	S	N	P_2O_5	K_2O	S
	(%)				(lb)			
Fertilizer materials								
Ammonium nitrate	34	-	-	-	3.0	-	-	-
Ammonium sulfate	21	-	-	24	4.8	-	-	4.1
Urea	45	-	-	-	2.2	-	-	-
Urea formaldehyde	38	-	-	-	2.6	-	-	-
Urea ammonium nitrate	32	-	-	-	3.1	-	-	-
Sulfur coated urea	34	-	-	21	3.0	-	-	4.8
Monoammonium phosphate	11	55	-	-	9.1	1.8	-	-
Diammonium phosphate	18	48	-	-	5.8	2.1	-	-
Superphosphate	-	20	-	12	-	5.0	-	8.3
Triple superphosphate	-	45	-	1	-	2.2	-	100
Potassium chloride	-	-	55	-	-	-	1.7	-
Potassium sulfate	-	-	50	-	-	-	2.0	-
Complete fertilizers								
12-6-6	12	6	6	-	8.3	16.6	16.6	-
24-12-12	24	12	12	-	4.2	8.3	8.3	-
22-4-4-12S	22	4	4	12	4.5	25	25	8.3
14-24-14-4S	14	24	14	4	7.1	4.2	7.1	25
16-6-8-18S	16	6	8	18	6.3	16.7	12.5	8.3
32-4-8-12S	32	4	8	12	3.1	25	12.5	8.3
Organic fertilizers								
Bone meal	1-4	2-8	-	-	50	22	-	-
Fish meal	10	2.6	-	-	10	38.4	-	-
Manures	1-4	0-2.2	1-2	-	50	30	-	-
Wood ash	-	0.9	5	-	-	111	20	-
Compost	1.5	1.5	1.5	1	67	67	67	100

*Fertilizer analysis is defined by law to be listed on the fertilizer bag.

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