

Northern Idaho Lawns

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Lawns are an important part of our landscape. Besides being aesthetically pleasing, they cover erodible soils, produce oxygen, and fit nicely into our forested areas. However, lawns can be expensive to care for if they are treated incorrectly. Fertilization done incorrectly can result in diseased lawns, weedy lawns, or lawns that adversely impact water quality through the leaching of applied nitrogen (nitrates) into groundwater.

To fertilize your lawn correctly, you need to understand its nutrient needs. Lawns need four macronutrients: nitrogen (N), phosphorus (P), potassium (K), and sulfur (S). In the Lewiston, Idaho, area lawns may also require iron (Fe) if the soil pH is greater than 6.8.

Macronutrients

Nitrogen (N)

Nitrogen helps grass produce healthy, lush blades. Northern Idaho lawns need 2 to 4 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. A gravelly soil will not hold N in the root zone as long as a loam soil.

There are two kinds of N fertilizer: slow release and quick release. Slow-release fertil-

izers become available slowly. Use them in sandy soils, in other soils that drain rapidly, or when grass plants are not growing rapidly—early spring and 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 are best to use when the grass is rapidly growing in early summer.

Phosphorus (P)

Phosphorus promotes strong root growth and encourages lawns to thicken quickly. Phosphorus levels are often low in northern Idaho soils. Because P does not move through the soil as N does, you should apply it when you establish the lawn or immediately after aerating it. If the soil is highly erodible, P will run off with sediment. 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. It also allows the lawn to stand up to heavy traffic and promotes winter hardiness. Potassium is usually adequate in our soils. Too much K can result in an accumulation of salts.

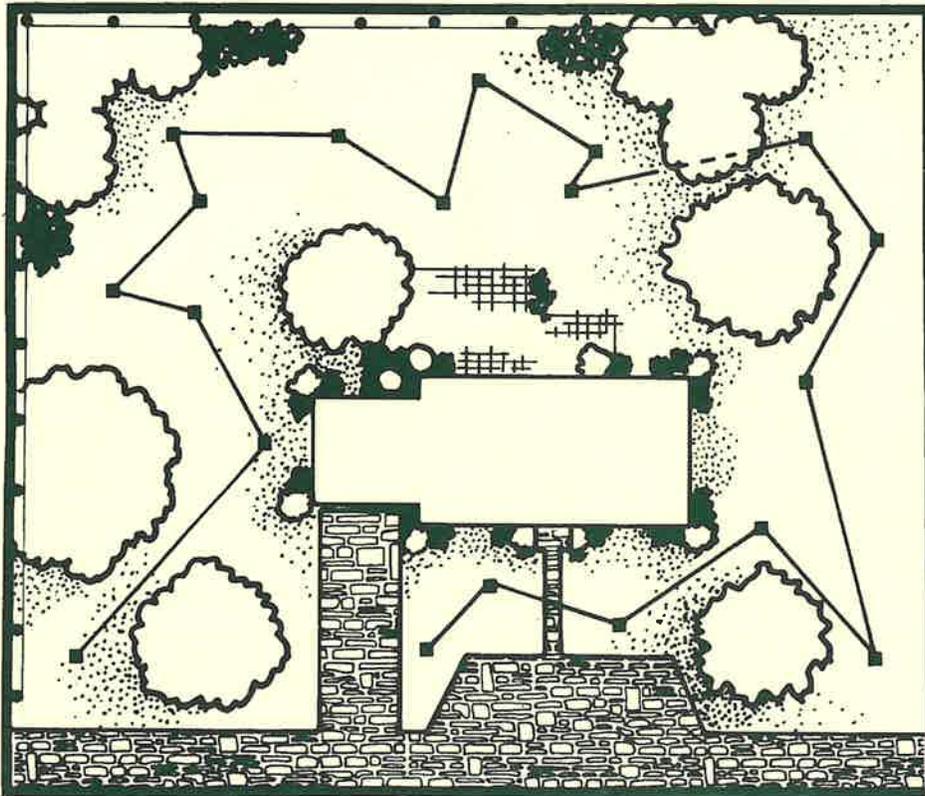


Fig. 1.
 Collect one sample from 15 to 20 locations, using a zig-zag pattern. Stay away from unusual areas, yard edges, and tree canopies. (■ = spots where samples are collected.)

Sulfur (S)

Sulfur is needed in most of northern Idaho. Be sure to include it in your fertilizer mix.

Fertilization Strategies

Lawns in northern Idaho can be fertilized based on one of two strategies. In one, fertilizer rates for the lawn are based on 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 using nutrient ratio (described below) in the 9 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 fertilizer or soil amendments.

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

Depth of Sample—When establishing a lawn, sample soil to a depth of 6 inches. For existing lawns, sample to a depth of 6 to 8 inches.

Equipment—Collect the soil sample in a clean stainless steel or plastic container such as a pail or bucket. You can use a small spade, garden trowel, 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 the sampling equipment is not contaminated with fertilizer materials.

Number of Cores—Randomly collect and mix 15 to 20 cores from a relatively uniform area to be fertilized. Do not mix these sample cores with sample cores from non-representative areas (e.g., flower beds, vegetable garden, etc.). Avoid unusual areas (e.g., areas where compost may

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

Use a zig-zag pattern when taking the soil samples (Fig. 1). Combine the sample 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 forward 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 county extension office.

Request the soil testing laboratory to analyze the sample for organic matter content, phosphorus (P), potassium (K), sulfur (S), soil pH, and electrical conductivity (EC).

Nitrogen—Determine the N application rate per 1,000 square feet of lawn based on the soil's organic matter content (Table 1).

Table 1. Nitrogen application rate based on a soil test for organic matter content.

Soil test Organic matter (%)	N-supplying capacity of your soil	Application rate per 1,000 ft ² (lb N)
7 or higher	Very high	1
5 to 7	High	2
3 to 5	Moderate	3
1 to 3	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). Soil-testing laboratories use three different methods of determining soil P: sodium bicarbonate (NaHCO₃), sodium acetate (NaOAc), and Bray I. Make sure you read the column in Table 2 that matches the method your soil testing laboratory used.

Table 2. Phosphorus application rate based on a soil test.

Soil test P			P-supplying capacity of your soil	Application rate per 1,000 ft ² (lb phosphate [P ₂ O ₅])
NaHCO ₃	NaOAc	Bray I		
(ppm) 12 or higher	(ppm) 5 or higher	(ppm) 52 or higher	Very high	None
9 to 12	4 to 5	40 to 52	High	None
6 to 9	3 to 4	30 to 40	Moderate	None
3 to 6	2 to 3	20 to 30	Low	1
0 to 3	0 to 2	0 to 20	Very low	2

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

Table 3. Potassium application rate based on a soil test.

Soil test K (ppm)	K-supplying capacity of your soil	Application rate per 1,000 ft ² (lb potash [K ₂ O])
250 or higher	Very high	none
150 to 250	High	1
100 to 150	Moderate	2
50 to 100	Low	4
less than 50	Very low	4

Sulfur—Apply S if your soil tests less than 10 parts per million (ppm) SO₄-S. An application rate of 1 pound S per 1,000 square feet should be adequate for an entire year.

Micronutrients—Northern Idaho lawns generally do not need micronutrients. The only potentially deficient micronutrient is iron (Fe). Iron is usually deficient only when the soil pH is greater than 6.8. Iron deficiency symptoms—“chlorosis” or the yellowing of new growth—can be corrected by applying a 0.5 percent solution of ferrous sulfate as a foliar spray or a chelated iron at the recommended label rate. Applications may need to be repeated if yellowing reoccurs.

Nutrient Ratio Strategy

The nutrient ratio fertilization strategy does not involve a soil test. It is based on applying 0.5 pound of N per 1,000 square feet of lawn for each month of active grass growth. (When

daily temperatures average above 80°F, most grasses are not actively growing unless you water them. Most lawns in northern Idaho start active growth in early to mid-April and often continue to grow until mid-October.) If, for example, your lawn grows actively 8 months each year, you would apply 4 pounds of N per 1,000 square feet over the year ($8 \times 0.5 = 4$).

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 one part S. Thus, if your N rate is 4 pounds per 1,000 square feet, your P recommendation would be 1.3 pounds, your K recommendation would be 2.6 pounds, and your S recommendation would be 1.3 pounds.

Let's say you have a lawn that is actively growing 6 months each year. You would calculate N, P, K, and S fertilizer needs for the year as follows:

$$0.5 \text{ lb N per } 1,000 \text{ ft}^2 \text{ per months } \times 6 \text{ months} \\ = 3.0 \text{ lb N per } 1,000 \text{ ft}^2$$

$$3\text{N} = 3.0 \text{ lb N} \quad 2\text{K} = 2.0 \text{ lb K} \\ 1\text{P} = 1.0 \text{ lb P} \quad 1\text{S} = 1.0 \text{ lb S}$$

You would buy a lawn fertilizer with a N:P:K:S ratio of 3:1:2:1 and apply as directed under "Fertilizer Application." 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 spring (Easter), one-fourth in late spring (Memorial Day), one-fourth in late summer (Labor Day), and one-fourth in fall (Halloween).

For example, if you need 3 pounds of N per 1,000 square feet, you would apply it as follows:

- 0.75 lb N around Easter
- 0.75 lb N around Memorial Day
- 0.75 lb N around Labor Day
- 0.75 lb N around Halloween

Do not apply more than 1 pound N per 1,000 square feet at one time unless you are using a slow release fertilizer.

Amount to Apply

Understanding fertilizer formulations is vital in applying the correct amount of nutrients. Fertilizers can be purchased in liquid or solid (granular) form.

The container label will have three or four numbers called the fertilizer grade, for example 16-20-0-15. The first number is always the percentage of N in the bag, the second number is the percentage of P_2O_5 , the third is the percentage of K_2O , and the fourth is the percentage of S or some other nutrient that is specified on the label. A fertilizer with a grade of 15-10-10-2 contains 15 percent N, 10 percent P_2O_5 (phosphorus pentoxide), 10 percent K_2O (potassium oxide), and 2 percent S.

Select a brand that supplies the nitrogen (N), phosphate (P_2O_5), and potash (K_2O) in approximately the same ratio as your soil test indicates or in the 3:1:2:1 ratio used in the ratio strategy. If the soil test recommends that you apply 1 pound of actual N per 1,000 square feet, 3 pounds of phosphate, and no potassium, this is a 1-3-0 ratio. You could use a material like 13-39-0-7, which would provide the correct ratio plus 7 percent sulfur.

Table 4 gives the amount of fertilizer material required to supply 1 pound of actual plant nutrient. The table lists fertilizer products commonly available in northern Idaho.

To calculate the amount of fertilizer to apply, use the following equation:

$$\frac{\text{lb nutrient recommended} \\ \text{per } 1,000 \text{ ft}^2 \times 100}{\% \text{ nutrient} \\ \text{in fertilizer material}} = \text{lb fertilizer needed} \\ \text{per } 1,000 \text{ ft}^2$$

Example 1:

To supply 1 lb N per 1,000 square feet using ammonium nitrate (34-0-0):

$$\text{for N, } \frac{1 \times 100}{34} = 2.9 \text{ lb per } 1,000 \text{ ft}^2 \text{ of } 34\text{-}0\text{-}0$$

Table 4. Nutrients in common fertilizers used on lawns.

Fertilizer materials	Total nitrogen (N)	Available phosphate (P ₂ O ₅)	Water soluble potash (K ₂ O)	Total sulfur (S)	Material needed to supply 1 pound of plant nutrient			
					(N)	(P ₂ O ₅)	(K ₂ O)	(S)
	(%)	(%)	(%)	(%)	(lb)	(lb)	(lb)	(lb)
Inorganic								
Ammonium nitrate	34	—	—	—	3.0	—	—	—
Ammonium sulfate	21	—	—	24	4.8	—	—	4.1
Urea	46	—	—	—	2.2	—	—	—
Urea formaldehyde	38	—	—	—	2.6	—	—	—
Urea ammonium nitrate solution	32	—	—	—	3.1	—	—	—
Sulfur coated urea (SCU)	31-36	—	—	21	3.0	—	—	4.8
Isobutylidene diurea (IBDU)	31	—	—	—	3.2	—	—	—
Monoammonium phosphate	11	48-55	—	—	9.1	2.0	—	—
Diammonium phosphate	16-18	46-48	—	—	5.8	2.1	—	—
Single superphosphate	—	18-20	—	—	—	5.0	—	8.3
Triple superphosphate	—	44-46	—	—	—	2.2	—	100.0
Potassium chloride	—	—	60-62	—	—	—	1.7	—
Potassium sulfate	—	—	50-53	18	—	—	2.0	—
Sulfate of potash magnesia	—	—	22	22	—	—	4.5	4.5
Organic								
Bone meal	1-4	2-8	0	0	50.0	22.0	—	—
Fish meal	10.0	2.6	0	0	10.0	38.4	—	—
Manures	1-4	0.2-2	1-2	0	—	—	—	—
Wood ash	0	0.9	5.0	0	—	111.0	20.0	—
Complete								
12-6-6	12	6	6	0	8.3	16.6	16.6	—
9-3-6-3S	9	3	6	3	11.1	33.3	22.2	33.3
12-4-8-4S	12	4	8	4	8.3	25.0	12.5	25.0
24-12-12	24	12	12	0	4.2	8.3	8.3	—
22-4-4-12S	22	4	4	12	4.5	25.0	25.0	8.3
14-24-14-4S	14	24	14	4	7.1	4.2	7.1	25.0
16-6-8-18S	16	6	8	18	6.3	16.7	12.5	5.5
32-4-8-12S	32	4	8	12	3.1	25.0	12.5	8.3

Example 2:

To supply 1 lb N per 1,000 square feet as urea (45-0-0) and 0.5 lb P₂O₅ per 1,000 square feet using triple superphosphate (0-44-0):

for N, $\frac{1 \times 100}{45} = 2.2$ lb per 1,000 ft² of 45-0-0

for P, $\frac{0.5 \times 100}{44} = 1.1$ lb per 1,000 ft² of 0-44-0

for N, $\frac{0.6 \times 100}{31} = 1.9$ lb per 1,000 ft² of 31-0-0

for P, $\frac{0.4 \times 100}{20} = 2.0$ lb per 1,000 ft² of 0-20-0

for K, $\frac{1.0 \times 100}{60} = 1.7$ lb per 1,000 ft² of 0-0-60

Example 3:

To supply 0.6 lb N per 1,000 square feet as IBDU (31-0-0), 0.4 lb P₂O₅ per 1,000 square feet using single superphosphate (0-20-0), and 1.0 lb K₂O per 1,000 square feet using potassium chloride (0-0-60):

For more information about fertilizers, see University of Idaho CIS 863, *Fertilizer Primer: Terminology, Calculations and Applications*.

Organic Fertilizers

Lawns use organic and synthetic (manufactured) fertilizers the same way. In both cases, plants take up N in the form of nitrate (NO₃⁻) or ammonium (NH₄⁺). Organic fertilizers break down and become available to plants at a

slower rate than synthetic fertilizers. Grass clippings left on the lawn after mowing are a good organic source of N. Lawn mowing should be timed to remove no more than one-third of the blade at one cutting.

Soil Amendments

Soil amendments include lime and elemental S. Northern Idaho soils are sometimes acidic enough to require the application of lime. If the pH of the soil is less than 5.1, apply lime in the fall. Apply 50 pounds per 1,000 square feet.

If the soil pH is greater than 7, add 25 pounds of elemental S per 1,000 square feet. Note that only elemental S, not sulfate-sulfur ($\text{SO}_4\text{-S}$), will lower soil pH. Soil amendments are best applied in the fall.

Problems of Overfertilization

Overfertilization is one of the primary causes of lawn problems. Diseases such as necrotic ring spot and insects such as leafhoppers show up more frequently in intensively managed, highly fertilized lawns. The combination of large amounts of fertilizer, too much water, and water at the wrong time of day sets up the perfect environment for many turfgrass (lawn) diseases.

Use only the amount of N that the soil test or ratio fertilization strategy indicates. Water in the morning between 6 a.m. and noon. Water deeply a couple of times a week instead of shallowly every day or every other day. Monitor soil moisture and the amount of water needed to wet the top 6 inches of soil.

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