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Northern Idaho Fertilizer Guide

Northern Idaho Lawns

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Lawns are a very 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 very expensive to care for if they are treated incorrectly. Incorrect fertilization can result in diseased lawns, weedy lawns, or lawns that adversely impact water quality through the leaching of applied 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). Lawns growing in neutral or high pH soils (pH values greater than 6.8) may also need the micronutrient iron (Fe).

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 and your choice of fertilizer. 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 fertilizers 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.

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.

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.

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.

Soil testing strategy

Soil tests for lawn fertilization should be done in early spring, within a month of the time you are planning the first application of fertilizer. To get a representative sample of soil in your lawn, take 12 to 15 subsamples, mix them together, and take a quart sample from the mixed sample.

Each subsample should come from the top 6 to 8 inches of soil. Make sure you exclude any surface debris that can change the soil test results, including grass blades. The more subsamples you take, the more representative your sample will be. Avoid taking samples from gardens, from under shrubs, or from unusual areas in the yard. If the soil in your lawn varies from one location to another, consider treating each unique area as a separate sample. For more information on how to collect and process a soil sample, see University of Idaho Extension Bulletin 704, *Soil Sampling*.

A standard soil test will also give you the pH of the soil and the percentage of organic matter. Soil test information and the following tables will help you determine the correct amount of each nutrient to apply.

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.

Soil test organic matter	N-supplying capacity of your soil	N application rate per 1,000 ft²
(%)		(lb)
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 two different methods of determining soil P — sodium bicarbonate ($NaHCO_3$) and sodium acetate (NaOAc). 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 ft²
$NaHCO_3$	NaOAc		
(ppm)	(ppm)		(lb phosphate [P_2O_5])
12 or higher	5 or higher	Very high	None
9 to 12	4 to 5	High	None
6 to 9	3 to 4	Moderate	None
3 to 6	2 to 3	Low	1
0 to 3	0 to 2	Very low	2

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 test K	K-supplying capacity of your soil	Application rate per 1,000 ft²
(ppm)		(lb potash [K_2O])
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) SO_4-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 ½ 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 pounds 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.

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 recommendation 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 lb N per 1,000 ft² per month × 6 months
= 3.0 lb N per 1,000 ft²

3N = 3.0 lb N
1P = 1.0 lb P
2K = 2.0 lb K
1S = 1.0 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.

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, 16-20-0-15, for example. 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 give you 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:

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

Example 1:
To supply 1 lb N per 1,000 ft² using ammonium nitrate (34-0-0):

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

Example 2:
To supply 1 lb N per 1,000 ft² as urea (45-0-0) and 0.5 lb P_2O_5 per 1,000 ft² using triple superphosphate (0-44-0):

$$\text{for N, } \frac{1 \times 100}{45} = 2.2 \text{ lb per 1,000 ft}^2 \text{ of 45-0-0}$$

$$\text{for P, } \frac{0.5 \times 100}{44} = 1.1 \text{ lb per 1,000 ft}^2 \text{ of 0-44-0}$$

Example 3:
To supply 0.6 lb N per 1,000 ft² as IBDU (31-0-0), 0.4 lb P_2O_5 per 1,000 ft² using single superphosphate (0-20-0), and 1.0 lb K_2O per 1,000 ft² using potassium chloride (0-0-60):

$$\text{for N, } \frac{0.6 \times 100}{31} = 1.9 \text{ lb per 1,000 ft}^2 \text{ of 31-0-0}$$

$$\text{for P, } \frac{0.4 \times 100}{20} = 2.0 \text{ lb per 1,000 ft}^2 \text{ of 0-20-0}$$

$$\text{for K, } \frac{1.0 \times 100}{60} = 1.7 \text{ lb per 1,000 ft}^2 \text{ of 0-0-60}$$

For additional information on fertilizer terminology, calculations, and application practices, see University of Idaho CIS 863, *Fertilizer Primer: Terminology, Calculations and Application.*

Organic fertilizers

Lawns use organic and synthetic (manufactured) fertilizers the same way. In both cases, plants take up N in the form of nitrate (NO_3^-) or ammonium (NH_4^+). Organic fertilizers break down and become available to plants at a slower rate than synthetic fertilizers.

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 300 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 (SO_4-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 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.

Table 4. Nutrients in common fertilizers used on lawns.

Fertilizer materials	Total nitrogen (N)	Available phosphate (P_2O_5)	Water-soluble potash (K_2O)	Total sulfur (S)	Material needed to supply 1 pound of plant nutrient (N)	(P_2O_5)	(K_2O)	(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 super-phosphate	—	18-20	—	12	—	5.0	—	8.3
Triple super-phosphate	—	44-46	—	1	—	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

Other University of Idaho lawn care publications

CIS 583 *Selecting Turfgrasses for Idaho Lawns* (35¢)

CIS 731 *Thatch in Lawns* (25¢)

CIS 792 *Calibration and Safe Use of Lawn and Garden Pesticide and Fertilizer Applicators* (35¢)

CIS 888 *Weed Control in Lawns* (50¢)

EXP 676 *Fairy Rings in Turf* (50¢)

EXT 723 *Herbicides for Lawn Weed Control* (50¢)

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