Fertilizing Lawns

Tom Cook and Brian McDonald

Fertilizing, along with mowing and irrigating, is one of the basic cultural practices used to produce healthy, dense, green lawns. The goals of this publication are to help you better understand the following:

- Reasons for fertilizing
- Optimum application rates and timing
- Types of fertilizer materials
- How to read a fertilizer label
- Application techniques
- How to avoid turf damage and environmental pollution resulting from improper fertilization

Do I really need to fertilize my lawn?

In terms of turf survival, the answer probably is no, since the majority of lawns in Oregon receive little or no fertilizer and are more or less functional. However, unfertilized lawns tend to be thin, light green or brown in color, and have high weed populations. Perennial ryegrass, the most widely planted grass in much of Oregon, is especially prone to diseases such as red thread, rust, and brown blight when under-fertilized. Adequately fertilized lawns look better than underfertilized lawns, compete better against weeds, hold up better under wear and tear, and recover more quickly from damage.

How often do I need to fertilize my lawn?

The ultimate goal is to apply the least amount of fertilizer needed to produce healthy turf and meet your personal aesthetic standards. The proper rates, frequency, and timing of fertilizer application depend on your desired turf quality, the type of fertilizer you use, the type of grass in your lawn, and whether you leave clippings on the lawn.

Fertilizer needs are lowest on older lawns where clippings have been regularly returned to the surface during mowing. In this case, bentgrass lawns growing in clay soils often get by nicely with a single application of nitrogen fertilizer each year. If perennial ryegrass or Kentucky bluegrass is planted on imported sandy loam soil, and clippings are removed, multiple applications of fertilizer may be needed on new lawns to keep them dense and attractive.

The key is to decide the quality of lawn you want. Figures 1 and 2 show potential fertilizer application schedules for western Oregon (Figure 1) and central and eastern Oregon (Figure 2). These schedules are not intended to be rigid; rather, they are examples of logical application times for different levels of turf quality.

Horizontal bars indicate time for each application. Adjust timing based on your goals and personal experience with your lawn. Each application is assumed to be at 1 lb N per 1,000 sq ft. On hungry lawns, 1..5 to 2 lb N per 1,000 sq ft

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can be used to stimulate density and color. Unless lawns are very weak, avoid early - spring applications since grass normally grows vigorously by itself at that time.

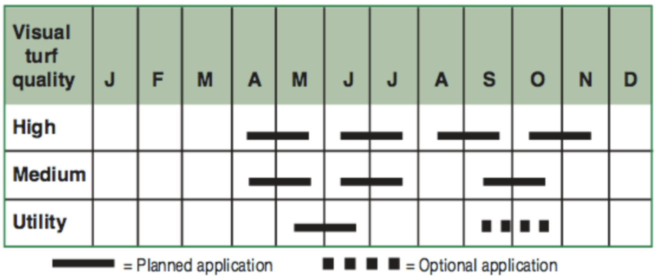

Figure 1. Fertilizer calendar for irrigated lawns in western Oregon.

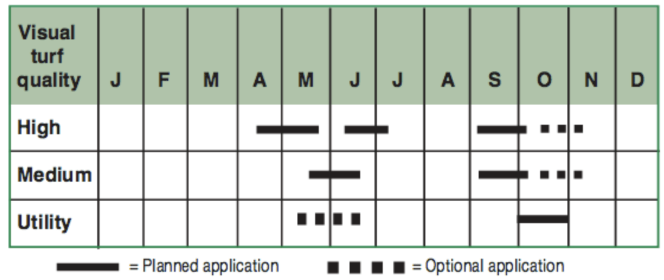

Figure 2. Fertilizer calendar for irrigated lawns in central and eastern Oregon.

If your goal is to maintain a consistently dense, dark green turf, keep in mind that a nitrogen fertilizer application generally produces a visual response for at least 4 weeks and sometimes as long as 8 weeks. Response is longer when fertilizer is applied in the cool temperatures of fall or early spring. Applications to weak, hungry grass generally do not last as long as applications to dense, healthy turf.

When soluble fertilizers such as ammonium sulfate are applied at normal application rates of 1 lb nitrogen (N) per 1,000 sq ft, expect to see green-up in as little as a week, followed by about 4 weeks of vigorous, dark green growth. Fertilizers containing slow-release nitrogen sources generally react more slowly but last slightly longer. The differences between soluble and slow-release nitrogen are discussed under “Types of nitrogen fertilizer.”

If you remove clippings, as most people do, you will see reduced color and growth after 4 weeks. Your lawn still will be dense and healthy, but color will be less intense. If you leave clippings on the lawn, color and growth enhancement may last 6 to 8 weeks. Returned clippings extend the effect of fertilizers by recycling nutrients during decomposition. This is an easy way to prolong fertilizer responses. Contrary to popular belief, clippings do not contribute significantly to thatch buildup.

In my own landscape, I use a watch-and-wait approach, with the goal of applying the least amount of fertilizer per year to maintain a functional turf. I also use the “special event” approach; I coast along with as little fertilizer as I can and then make a strategic application about 3 weeks before my in-laws visit. The lawn looks good when they show up, and in between visits I don’t have to mow so much grass!

Should I have my soil tested before fertilizing?

In the best of all worlds, everyone would get a soil test before planting a lawn and would repeat the test each year and adjust the fertilizer program according to the results. This approach is common at many golf courses and athletic field complexes with professional turf managers.

Unfortunately, it takes some effort for homeowners to find a testing laboratory and interpret test results. As a result, very few people get their soil tested regularly. If you suspect you have a problem soil, contact a local professional analytical lab or estimate your soil nutrient content by using a soil test kit purchased from a retail nursery center.

What are the important fertilizer elements for lawns?

Nitrogen (N)

Nitrogen is the most important nutrient in most fertilization programs. Applied at proper rates, nitrogen stimulates vertical growth, improves turf density, and makes the grass darker green. By stimulating growth, nitrogen reduces the severity of diseases such as red thread, rust, and brown blight.

Soil tests for nitrogen are available, but they're seldom used. Nitrogen levels in soil fluctuate rapidly, which makes interpretation for fertilizer recommendations difficult.

Annual nitrogen needs

Of the commonly used turf grasses, Kentucky bluegrass and perennial ryegrass need the most nitrogen, tall fescue is intermediate, and the fine fescues and bentgrasses persist well at low levels of nitrogen. All grasses turn darker green when fertilized with nitrogen.

For top-quality ryegrass or bluegrass lawns, you may have to apply up to 6 lb nitrogen per 1,000 sq ft per year. Medium-quality turf can be achieved with 3 to 4 lb nitrogen per 1,000 sq ft per year. Functional turf can be produced with as little as 1 to 2 lb nitrogen per 1,000 sq ft per year. Bentgrass and fine fescue lawns require about half as much nitrogen fertilizer as ryegrass or bluegrass for any given quality.

Nitrogen fertilizer application rates

The quantities given in the previous paragraph are for total annual nitrogen. In most cases, the total amount is split between two or more applications (see Figures 1 and 2).

Rates per application generally range from 0.5 to 1 lb soluble nitrogen per 1,000 sq ft of turf. Below 0.5 lb soluble N, initial and residual response is poor. Above 1 lb soluble N, the chance of foliar burn and excessive growth increases. Most commercial product directions are based on applying 0.9 to 1 lb of total N per 1,000 sq ft per application. If you follow package directions, you generally will get good results.

Application rates for weak, thin lawns and lawns fertilized in late fall or early winter may be up to 2 lb total N per 1,000 sq ft.

Note that the rates discussed here give the amount of nitrogen to apply. Fertilizer labels indicate the percentage of nitrogen in the product (see "How can I decipher a fertilizer label?"). Table 1 shows how to estimate the amount of fertilizer to apply based on the product's percentage N content and your desired rate of application.

Table 1. Pounds of product per 1,000 sq ft needed to apply 1, 1.5, or 2 lb N to turf.

	Target rate (lb N per 1,000 sq ft)		
% nitrogen in fertilizer	**1**	**1.5**	**2**
5	20	30	40
8	12.5	18.8	24
10	10	15	20
15	6.8	10.2	13.6
20	5	7.5	10
25	4	6	8
30	3.4	5.1	6.8
35	2.9	4.3	5.7
40	2.5	3.8	5
45	2.2	3.3	4.4

Figure 3. This turf was severely burned when a soluble nitrogen fertilizer was applied to dew-covered grass and not thoroughly watered in

Types of nitrogen fertilizer

Nitrogen fertilizers are classified by the rate of nitrogen release (that is, availability to plants). The two general types are water-soluble nitrogen and slow-release nitrogen.

Water-soluble nitrogen is available immediately after being watered in, and it rapidly turns the lawn green and stimulates growth. Nitrogen in soluble fertilizers doesn't last long, so you need to apply it more frequently at lower rates to maintain a steady supply of nitrogen to the turf. Examples of water-soluble nitrogen fertilizer materials include ammonium nitrate, urea, ammonium phosphate, and ammonium sulfate.

Water-soluble fertilizers have salt-like characteristics and can cause desiccation injury (burning) by drawing water out of leaf tissue. This problem is most common when people apply ammonium sulfate or urea to moist turf and fail to water it in immediately (Figure 3). Avoid foliar burn by irrigating turf thoroughly after applying any water-soluble fertilizer. Water long enough to wash granules off foliage or until granules completely dissolve.

Slow-release nitrogen fertilizers have relatively low water solubility and release nitrogen slowly over a longer period of time than soluble fertilizers. Therefore, they may give less initial color and growth response but are less likely to cause fertilizer burn. They're significantly more expensive than soluble nitrogen fertilizers.

Common slow-release nitrogen fertilizers include methylene ureas (Nitroform and Nutralene), sulfur-coated urea (SCU), polymer-coated urea (PCU), polymer-coated SCU (PCSCU), isobutylidenediurea (IBDU), and natural organic, protein-based sources such as activated sewage sludge and mixtures of feather meal, dried poultry waste, and dried blood.

Synthetic methylene ureas release nitrogen when soil microorganisms break them down. Since microbes are more active in warm weather, these products work well in the summer but poorly in winter and early spring.

SCU nitrogen release depends largely on water that permeates the sulfur shell and dissolves the urea. These products release nitrogen faster at higher temperatures. Common SCU materials release nitrogen slightly faster than other slow-release sources. This source appears in many common fertilizers.

PCU and PCSCU sources depend on water movement through the polymer shell to dissolve the urea, which then diffuses into the soil, where the nitrogen is taken up by plant roots. Nitrogen release is faster in warm weather and slows down dramatically when soil temperatures drop to about 40°F.

IBDU depends primarily on water hydrolysis to release nitrogen and is less affected by soil temperatures than natural or polymer-coated fertilizers. It is effective at all times of the year, but first-time applications tend to produce a weak response. Used repeatedly over time, this is a highly effective material.

Protein-based natural products release nitrogen when soil micro-organisms break them down. Thus, they are highly temperature-dependent and release nitrogen faster during summer and fall when soil temperatures tend to be high. They produce effects much like those of methylene ureas, PCU, PCSCU, and IBDU. Natural organic materials work well and are widely used in Oregon.

Commercial fertilizers often combine soluble and slow-release nitrogen sources to give good initial and residual response, lower burn potential, and intermediate cost.

Potassium (K)

Potassium is an important element for healthy turf and often is applied in relatively large amounts. Although it causes no color or growth response, potassium seems to slightly enhance plant hardiness to heat and cold. It also may reduce drought-induced wilting and increase wear tolerance.

A general rule for soils in Oregon is that soil potassium levels below 250 ppm K indicate a need for potassium fertilization. Based on this standard, many lawns in eastern Oregon do not need potassium fertilizer. In western Oregon, soil potassium often is low, indicating potassium should be applied regularly.

Application rates should be about two-thirds the rate of nitrogen (i.e., 2 lb K^2 0 for every 3 lb N). For example, a fertilizer labeled 12-3-8 or 24-3-16 would give the proper ratio of N to K^2 0. (Note that fertilizer labels list the potassium content as K^2 0, or soluble potash.)

Phosphorus (P)

Healthy turf does not show a growth or color response to phosphorus. Contrary to the popular notion expressed in many newspapers, magazines, and garden books, phosphorus does not enhance root growth of grasses unless it is added to deficient turf. Since the vast majority of lawn soils contain adequate P, supplemental applications usually are wasteful.

Phosphorus is best applied only when soil tests indicate it is low. In all regions of Oregon, a soil test level above 20 ppm indicates that P is adequate and does not need to be applied.

If you do apply phosphorus, use it sparingly. Turf rarely benefits from more than 1 lb P^2 O^5 per 1,000 sq ft per year.

Most fertilizers are “complete,” meaning they contain nitrogen, phosphorus, and potassium. For routine lawn applications, look for fertilizers with little or no P. (Note that phosphorus is listed on fertilizer labels as P^2 O^5, or phosphoric acid.) Avoid products such as 15-15-15 or similar ratios because they contain too much P for lawn needs and increase the potential for P pollution of surface waters.

Be cautious when selecting natural organic fertilizer products and composts because they often contain relatively high P levels.

Sulfur (S)

Sulfur is an important plant nutrient, particularly for bent-grass, which is very common in most old lawns west of the Cascades. Long-term research at Washington State University shows that bentgrass turf receiving 2.5 to 3.5 lb sulfur per 1,000 sq ft per year has less Take-all and Fusarium patch diseases and less encroachment by annual bluegrass than turf receiving less sulfur. Many commonly used turf fertilizers contain sulfur, so you often can meet the need for S as part of a regular fertilizer program.

Excessive use of sulfur-containing fertilizers such as ammonium sulfate will decrease the pH of the soil and thatch, resulting in excessively acidic soil. As a rule, apply no more than 3.5 lb S per 1,000 sq ft per year.

pH, calcium (Ca), and magnesium (Mg)

Calcium and magnesium rarely cause a growth or color response in grass. Their main impact is their effect on soil pH. When added as limestone, they help raise the pH of acid soils and indirectly improve turf fertility.

Turfgrasses will grow in a wide range of soil pH, but most have an optimum range, as noted in Table 2. Soil pH in the optimum range is important because it increases availability and soil retention of many of the nutrients needed for turfgrass growth.

A low soil pH indicates acidic soil. Acidic soils are common in western and coastal Oregon, but are rare in central and eastern Oregon.

If your soil test pH value falls below the optimum range for the grasses in your lawn, a lime application will help raise the pH. It often takes 2 or more years to significantly change turfgrass soil pH with lime, because lime is not very soluble and can’t be mixed into the soil in lawns.

There are two common types of lime—agricultural limestone and dolomitic limestone. Agricultural lime contains calcium, while dolomitic lime contains both calcium and magnesium.

Soil test values for calcium and magnesium can help you determine which type to apply. If magnesium levels are above 1.5 meq/100 grams of soil, apply agricultural limestone. If Mg is below 1.5 meq/100 grams of soil, apply dolomite. Coastal counties usually are the only areas in Oregon where deficiencies of magnesium are found; consequently, they are most likely to benefit from dolomitic limestone.

As a general rule, don’t exceed 50 lb lime per 1,000 sq ft per application or a total of 100 lb lime per 1,000 sq ft per year on established turf. During a single year, split applications between spring and fall to avoid lime accu-mulation at the soil surface.

Don't apply nitrogen fertilizers that contain ammonium sulfate or urea with or immediately after liming. The presence of lime may cause ammonium to turn to vapor (volatilize) and be lost to the atmosphere.

Table 2. Optimum soil pH ranges for commonly grown turfgrasses.

Grass	Optimum pH range
Bentgrasses	5.0 - 6.5
Perennial ryegrass	5.5 - 6.5
Fine fescues	5.5 - 6.5
Tall fescue	5.5 - 6.5
Annual bluegrass	6.0 - 7.0
Kentucky bluegrass	6.0 - 7.0

Figure 4. Brown rust stains where iron contacted concrete and then was watered in.

Iron (Fe)

Iron is known as a micronutrient because it is required in very small amounts. Iron deficiency in turfgrasses is not widespread, but it may occur in eastern Oregon, where soil pH can be above 7.0. (High soil pH limits the availability of iron to plants.) Most lawns do not need supplemental iron to produce healthy turf.

Nonetheless, iron is a common supplement in commercial fertilizers because it provides a rapid, short-lived, greening response. Many fertilizers contain iron in soluble form. If you get these materials on concrete sidewalks or driveways and then apply water, you can count on having brown stains (Figure 4). Like tattoos, iron stains are difficult and expensive to remove. To prevent stains, buy fertilizers that do not contain iron or use a blower to blow the fertilizer back onto the lawn before you irrigate.

How can I decipher a fertilizer label?

State law requires that certain information be printed on the fertilizer bag or label. This is your guarantee that you will get what you pay for. Fertilizer companies are fined by the state if the analysis on the bag does not match the contents. The generic label in Figure 5 explains key information contained on all fertilizer bags. Next time you look at fertilizers, study several labels to see how products vary.

Complete fertilizers containing N, P^2 0^5, and K^2 0 in ratios of about 6-1-4 are good for balanced turf fertility, although many of the top brands have lower K20. You can feel confident using complete fertilizers with ratios ranging from 24-4-16 (6-1-4) to 24-3-6 (8-1-2) or anything close to that range.

Fertilizers often are marketed as spring, summer, or fall and winter fertilizers. Usually, summer fertilizers contain a higher proportion of slow-release nitrogen, and winter fertilizers contain more potassium. These adjustments are essentially meaningless and are simply used to get customers to buy different products for each season. If you stick with a good basic ratio, you can use the same product year-round and produce beautiful turf.

Notice that half of the total nitrogen in the example below is from soluble sources (nitrate and ammonium), and half is from slow-release sources (polymer-coated sulfur-coated urea). If you apply 1 lb of total nitrogen from this product, you will apply 0.5 lb of soluble nitrogen.

To find out how much of any given nutrient you are applying, multiply your fertilizer application rate times the percentage of that nutrient in the fertilizer. For example, if you apply 6 lb of the fertilizer represented by the sample label, you would be applying 0.84 lb of sulfur (6 lb x 0.14 = 0.84)

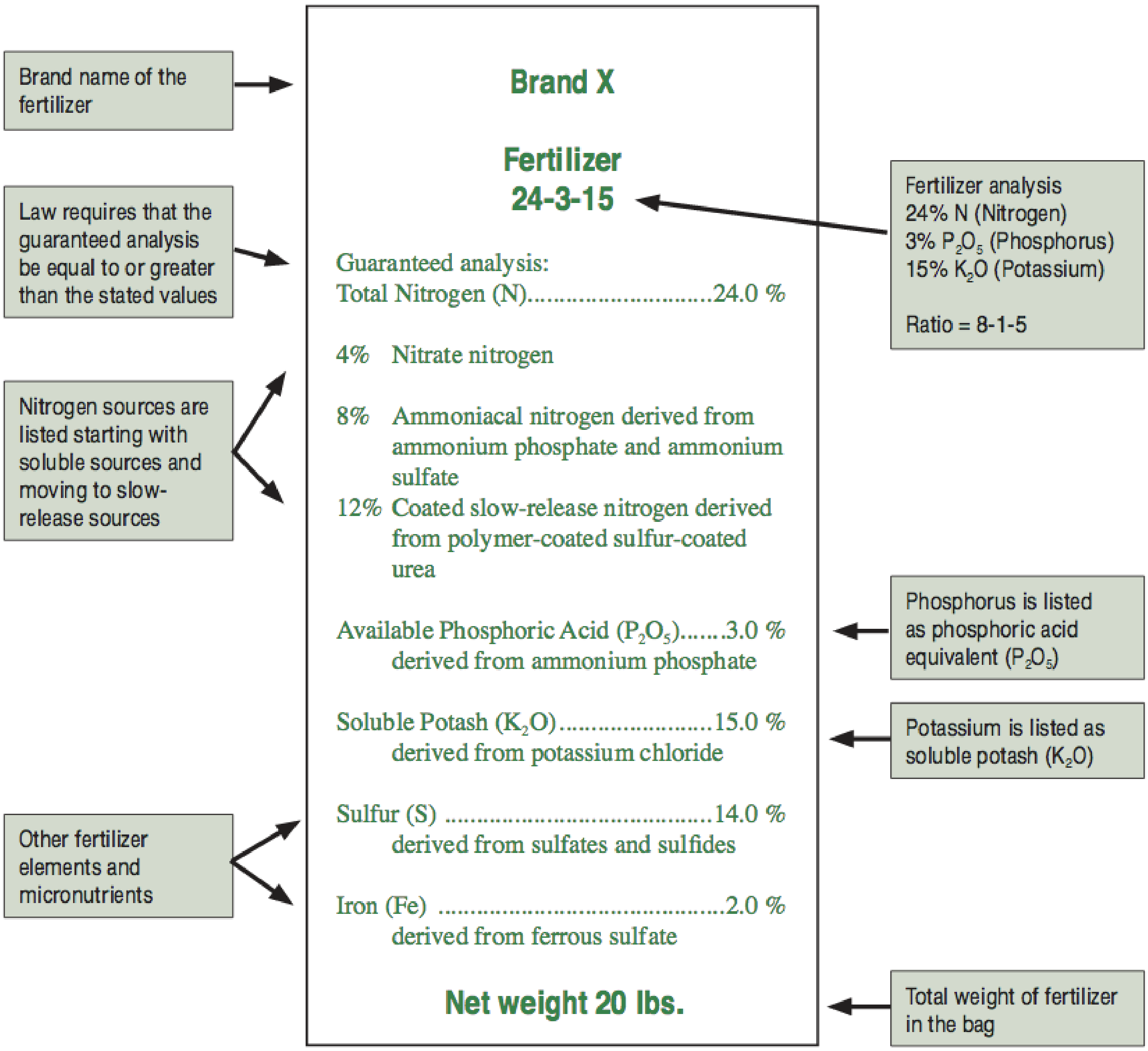

Figure 5. Generic fertilizer label with explanation of terms.

What is the best way to apply fertilizer?

For small lawns, the most accurate way to apply fertilizer is with a drop-type spreader. Drop spreaders are highly efficient and dramatically reduce the possibility of misapplying fertilizer to drive-ways, sidewalks, or streets.

Because fertilizer goes right where you put it and does not spread laterally once it hits the ground, you need to overlap slightly with each consecutive pass to avoid skips (Figure 6). A good method is to apply the fertilizer at half the application rate and go over the area twice at different angles to minimize the possibility of skips (Figure 7). Make sure you are moving before opening the spreader to avoid dropping a large quantity of fertilizer in one spot.

When buying a spreader, purchase only top-of-the-line name brands and avoid discount specials. In extensive spreader testing at OSU, we have found that many cheap spreaders are so poorly constructed that they cannot be calibrated to apply fertilizer accurately. The top brands generally are fairly accurate. Most commercial fertilizers have instructions for settings on common spreaders.

For larger areas, it is easier to apply fertilizer with a rotary spinner-type spreader (Figure 8). These spreaders are not very accurate and tend to throw fertilizer past the lawn into flower and shrub beds, or on side-walks and streets. They are best used only where lawns are surrounded by other plant materials that can trap and use the fertilizer.

Because consumer models of rotary spreaders are so inaccurate, it is hard to give advice on how to use them. Trial and error may be the only way to learn with any given brand. Try using the half-rate setting and making consecutive passes at the spacing recommended on the fertilizer bag. Spacing can range from 5 to 15 feet, depending on the machine and fertilizer product. After covering the entire area at the half rate, go over it again at a different angle.

Figure 6. Drop spreaders are very accurate but must be operated properly. The lawn on the right has stripes because the operator failed to overlap each pass.

Figure 8. Rotary spinner spreaders are great for large open areas (left) but are not suited for confined areas next to roads and sidewalks (right). Near these areas use a drop spreader to make sure the fertilizer does not go in the street, where it can get into storm sewers and pollute rivers.

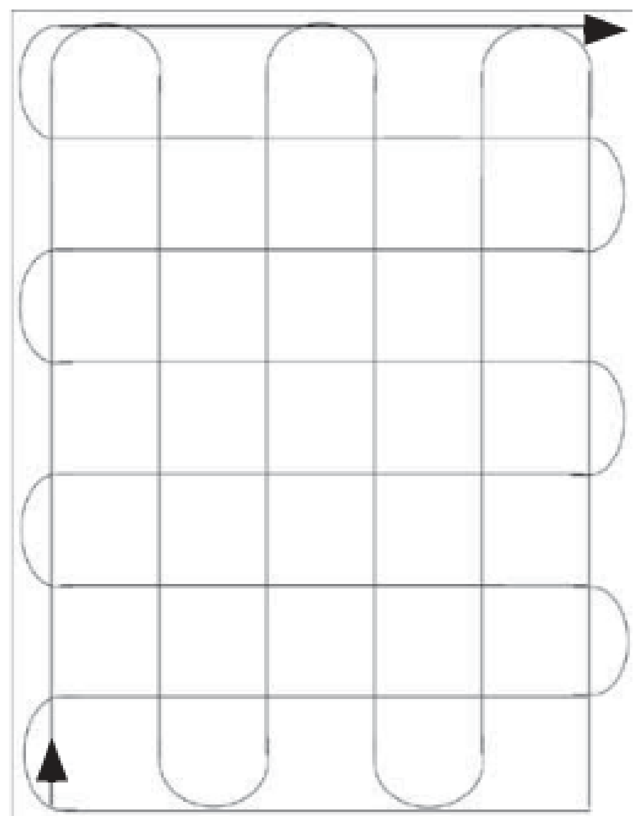

Figure 7. Typical application pattern for a drop spreader. By overlapping each pass slightly and covering the area twice in different directions, you can achieve thorough coverage without skipped areas.

What should I know before I fertilize?

Start by reading the package directions so you know how much area the fertilizer will cover. Adjust your spreader based on the bag directions. Fill the spreader on a level surface away from the lawn. Make sure the spreader is in the closed position so you do not spill fertilizer at the loading site.

When using soluble fertilizers, avoid burning grass by apply-ing the fertilizer when the lawn is dry and temperatures are cool. Evening is better than morning, when there often is dew on the grass.

Avoid fertilizing during very hot summer weather. Grass normally doesn't need fertilizer in the heat of summer, and growth at that time tends to favor shoots over roots. If you do fertilize in midsummer, use lower rates.

After you apply the fertilizer, use a blower or broom to remove fertilizer from sidewalks or other hard surfaces, where it might stain concrete or get washed into storm sewers. After cleaning hard surfaces, water the lawn to reduce the chance of foliar burn and to wash the fertilizer into the root zone, where the grass roots can use it. If the area is dry, irrigate thoroughly just as you would when watering your lawn. If the area is moist, water just enough to wash the fertilizer off the foliage and into the root zone.

What about environmental pollution?

The two nutrients of greatest concern are nitrogen and phosphorus. The primary concerns are leaching into groundwater (nitrogen) and runoff that contaminates surface waters (phosphorus).

High levels of nitrogen in groundwater can lead to high levels of nitrogen in wells. Numerous health disorders are associated with elevated nitrogen in drinking water.

Phosphorus pollution of surface waters leads to plant growth in streams, ponds, and lakes. Algal blooms resulting from high phosphorus levels can reduce oxygen levels in waterways to the point of killing fish. Phosphorus-stimulated growth of aquatic plants also can result in fouled waterways, rendering them unusable for recreation purposes.

There are many sources of nitrogen and phosphorus pollution. Research at universities has consistently demonstrated that synthetic fertilizers applied to lawns are not a major source of surface or groundwater pollution. Grass is a very efficient absorber of nitrogen, and leaching and run-off are rare when applicators use common sense. When fertilizer is applied properly to lawns at low rates, leaching is unlikely to occur and runoff is no more likely than it is from nonfertilized lawns.

A report in *Penn State Agriculture* (summer 1999) (http://www.aginfo.psu.edu/PSA/s99/contents.html) indicates that 99.7 percent of nitrogen pollution comes from sources other than golf courses and lawns.

Atmospheric deposition and agriculture accounted for 87.9 percent of all nitrogen pollution, urban stormwater run-off accounted for 8.4 percent, septic systems 3.4 percent, and golf courses and lawns only 0.3 percent.

The same study found that phosphorus pollution sources included 68.8 percent from agriculture, 13.1 percent from septic systems, 10.8 percent from urban stormwater runoff, 7.1 percent from atmospheric deposition, and only 0.2 percent from golf courses and lawns. A total of 99.8 percent of phosphorus pollution came from sources other than golf courses and lawns.

The Penn State University study is similar to many others reported in recent years. When measurements are made on specific lawn sites, very little nitrogen or phosphorus shows up as either leachate or runoff. Additional studies are listed in “For more information.”

Does this mean that lawn fertilizers don't pose a potential pollution risk? Actually, there are many potential problems with fertilizer, but, if you use common sense, you can be confident you are not contributing to pollution.

Tips for ensuring that lawn fertilizer doesn't contribute to pollution

- Make sure the fertilizer goes on the lawn and not on the sidewalks or in the street. The single greatest source of pollution from lawn fertilizers is the fertilizer that ends up in the street.
- Remove any fertilizer from hard surfaces before irrigation to avoid flushing fertilizer into storm sewers.
- Apply fertilizer at times when grass is growing and actively absorbing nutrients (i.e., spring through fall).
- Fertilize more often at lower rates rather than less often at higher rates.
- Observe your lawn over time to determine the least amount of fertilizer needed annually to provide the quality of grass you desire.
- Use fertilizers with low or no phosphorus (the middle number in the analysis). Avoid applying more than 1 lb P_2O_5 per 1,000 sq ft per year.
- On sandy soils, use slow-release fertilizers to avoid an overload of nitrogen immediately after application. Both synthetic slow-release and natural organic fertilizers are good choices in this situation.
- Leave unfertilized buffer zones near lakes or streams. The best solution is to eliminate mowed turf next to waterways in favor of unmowed natural grass stands or dense native or native-like vegetation that requires no fertilizer. Mowed grass all the way to the water surface is an accident waiting to happen.
- Be cautious when selecting composts and natural organic fertilizers, since they generally contain relatively high levels of phosphorus. For example, 0.25 inch of compost containing 0.75 percent N and 0.75 percent P_2O_5 translates to 2 lb of N and 2 lb of P_2O_5 per 1,000 sq ft per application.

Are synthetic fertilizers bad for the soil?

The question of synthetic versus organic fertilizers is not a matter of good versus bad. You can achieve the same results with either natural or synthetic sources. While it is possible to create problems with any fertilizer, it isn’t easy to do so.

Fifty years ago, all of the available fertilizers contained soluble nitrogen. Research found that prolonged use of these products could acidify the soil enough to change the soil microbial balance. For example, we conducted experiments using only nitrogen from ammonium sulfate on bent-grass turf. Over a 10-year period, soil pH decreased from 5.4 to 3.8, which is incredibly acidic. That acidity level caused a shift from a bacteria-dominated environment to a fungus-dominated environment. How did the grass perform? It grew just fine. It was dense, dark green, and pure. It also had very deep thatch. The thatch developed because the environment in the thatch and soil layer was not conducive to microbes that decompose thatch. Was it a dead soil? No, but it was definitely out of balance.

Experience has shown that by using a variety of nitrogen sources and applying lime as needed to raise soil pH to 6.0 to 7.0, we can produce excellent turf indefinitely and maintain healthy soil microbe populations. Turf response and soil health are the same from organic slow-release and synthetic slow-release fertilizers. If you avoid using a steady diet of ammonium sulfate for many years, and you lime as needed, soil microbiology will be similar to that in soils treated with slow-release organic fertilizers.

Should I add microorganism supplements to my lawn?

Research does not support the need for supplemental applications of microorganisms. A recent review of work from five Midwestern states concluded the following.

- Supplemental applications of microorganisms had no long-lasting effects on soil microbiology.
- Pesticide applications did not adversely affect soil microbiology.
- Even sand-based root zones rapidly achieve microbial ,º, equal to native soils soon after planting, even without supplements (Gaussoin, 2004).

While it doesn't hurt to apply products supplemented with microorganisms, remember that it is the fertilizer in the product, not the microorganisms, that causes the lawn to respond.

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For more information

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Trade-name products and services are mentioned as illustrations only. This does not mean that the Oregon State University Extension Service either endorses these products and services or intends to discriminate against products and services not mentioned.

Use pesticides safely!

- *Wear protective clothing and safety devices as recommended on the label. Bathe or shower after each use.*
- *Read the pesticide label—even if you've used the pesticide before. Follow closely the instructions on the label (and any other directions you have).*
- *Be cautious when you apply pesticides. Know your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.*

About the authors

Tom Cook

Brian McDonald (https://extension.oregonstate.edu/people/brian-mcdonald)

Senior Faculty Research Assistant