

Calibrating Fertilizer Spreaders for the Home Lawn

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How much fertilizer should you use on your lawn? Too much can result in turf burn, wasted product and money, and potential environmental concerns. Too little will result in a low-density lawn that will not be attractive or competitive against weed invasions.

To insure that you apply the proper amount of fertilizer to your lawn, you must calibrate your fertilizer spreader. You should calibrate your spreader each time you use a new (different) fertilizer because not all fertilizers have the same particle size or density. The information on the fertilizer bag is a good starting point for the calibration process but remember that spreaders can differ significantly. Calibrating your spreader will take a little bit of work, but the series of fairly simple steps below will help you complete the task.

Types of Spreaders

The two most common types of fertilizer spreaders are rotary and drop spreaders (Figures 1 and 2). Rotary spreaders distribute material through centrifugal force; drop spreaders drop material directly beneath the spreader. Both types have advantages and disadvantages.

Because they spread a wider swath, rotary spreaders work well for large areas. They are not as precise as drop spreaders but are less likely to leave missed areas on the lawn that may result in dark and light green stripes due to differences in applied fertilizer. Drop spreaders allow for precise fertilizer placement and reduce the incidence of off-target application in landscape beds, on sidewalks, and in driveways.



Figure 1. Walk-behind and over-the-shoulder rotary (centrifugal) spreaders.



Figure 2. A common drop spreader.

Determining the Lawn Area

The first step in determining how much fertilizer you need to apply is to identify the size of your lawn. You may be able to find information about your property on your city's Property Valuation Administration (PVA) Web page. If you are unable to find your property size from city documents, measuring the area of the yard is fairly simple with a measuring tape or wheel (Figure 3).

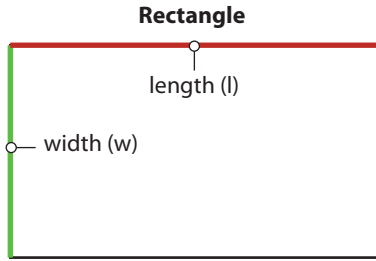
To find the general area of your yard, measure the width and the length of your property. If your property is not a rectangular shape, you can still determine the area rather quickly with the same instruments. Area calculations for different shapes are shown in Figure 4.

Once the total area of the property is found, you will need to determine the area of the lawn. Begin by measuring the house and all areas that are not lawn. By

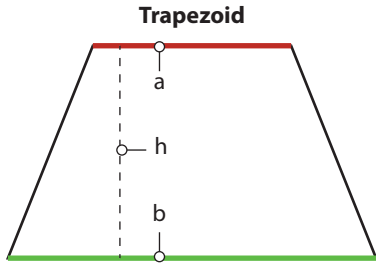


Figure 3. Common tools for measuring the area of the lawn: a walking wheel and a measuring tape.

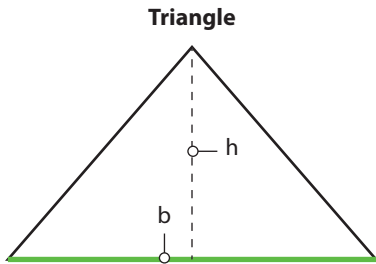
Figure 4. Area calculations for general shapes.



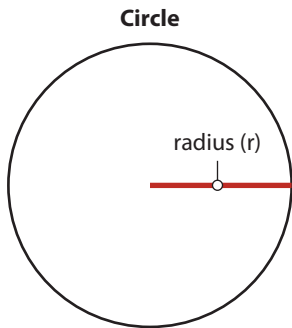
Area = (l)(w)



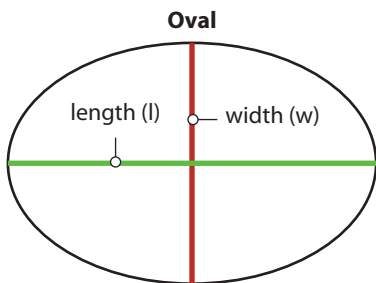
Area = [(a+b)/2](h)



Area = [(b)(h)]/2



Area = πr^2



Area = (l)(w)(0.8)

subtracting all non-lawn areas from the total property size, you can define the area in grass (Figure 5).

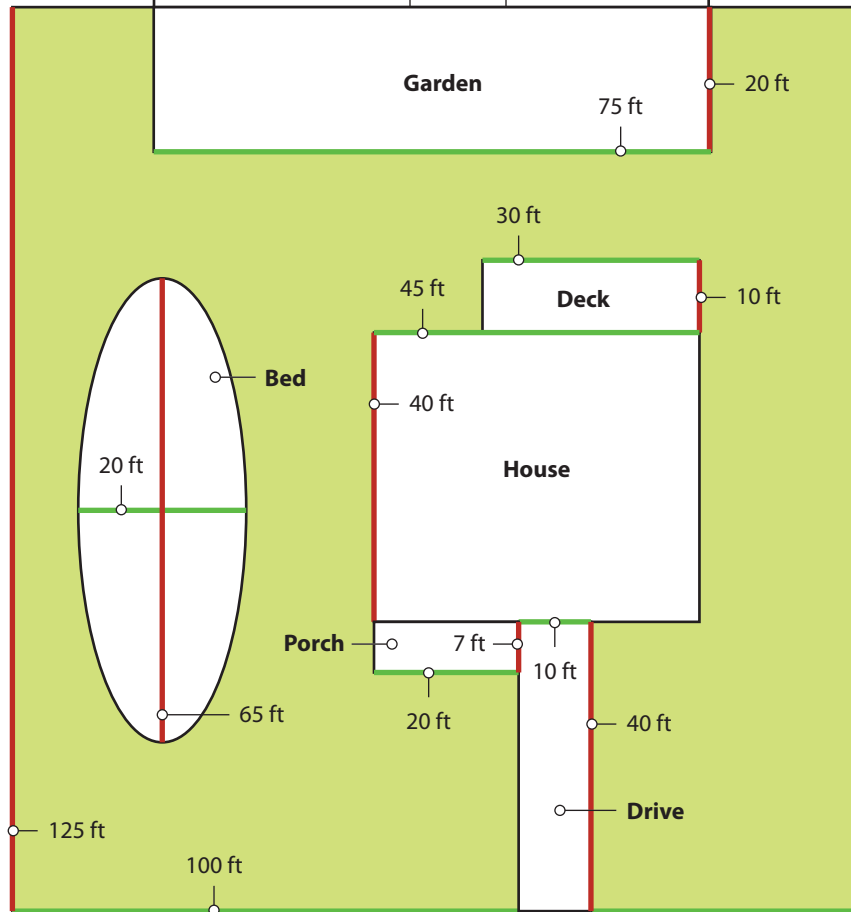
Knowing the area of the lawn is important for knowing how much fertilizer to purchase. A common fertilizer recommendation is to apply 1 pound of nitrogen (N) per 1,000 square feet. If we use the area of the lawn determined in

Figure 5, we would know to apply just over 7 pounds (7.32) of nitrogen to the lawn.

Fertilizers do not contain 100 percent nitrogen; therefore we next need figure out how many pounds of the product it will take to reach 7.32 pounds of nitrogen for any given fertilizer.

Figure 5. Example calculations for determining the area of a lawn.

Elements	sq ft	Dimensions
Total lot:	12,500	125 ft x 100 ft
Subtract:		
house	1,800	45 ft x 40 ft
deck	300	30 ft x 10 ft
drive	400	40 ft x 10 ft
garden	1,500	75 ft x 20 ft
porch	140	20 ft x 7 ft
bed	1,040	(65 ft x 20 ft) x 0.8
subtotal	5,180	
Remainder:	7,320	



Example 1: 46-0-0 (urea)

Urea has a very high percentage of nitrogen but no phosphorous (the 2nd number in the analysis) and no potassium (the third number in the analysis). A 50-pound bag of urea will contain 23 pounds of nitrogen (more than enough to cover the 7.32 pounds of nitrogen required for the lawn).

$$\begin{aligned} &50 \text{ lb bag} \times 46\% \text{ N} \\ &= 50 \times 0.46 \\ &= 23 \text{ lb of N in the bag} \end{aligned}$$

Example 2: 10-6-4

This fertilizer has a lower nitrogen percentage than Example 1 and also contains phosphorous and potassium. Purchasing a 50-pound bag of this product would give us 5 pounds of N (not quite enough for the lawn) as well as 3 pounds of phosphate (P_2O_5) and 2 pounds of potash (K_2O).

$$\begin{aligned} &50 \text{ lb bag} \times 10\% \text{ N} \\ &= 50 \times 0.10 \\ &= 5 \text{ lb N in the bag} \end{aligned}$$

$$\begin{aligned} &50 \text{ lb bag} \times 6\% \text{ P}_2\text{O}_5 \\ &= 50 \times 0.06 \\ &= 3 \text{ lb P}_2\text{O}_5 \text{ in the bag} \end{aligned}$$

$$\begin{aligned} &50 \text{ lb bag} \times 4\% \text{ K}_2\text{O} \\ &= 50 \times 0.04 \\ &= 2 \text{ lb of K}_2\text{O} \text{ in the bag} \end{aligned}$$

Calibrating

The goal of calibration is to determine the amount of material to be delivered by the spreader. This goal will be achieved by measuring the output of the spreader over a given area. The principles of calibration for rotary and drop spreaders are very similar. The primary difference is the width of spread.

Use the following steps to calibrate your spreader.

1. Know the fertilizer rate (i.e. 1 lb N/1,000 sq ft).
2. Know the analysis of the product you wish to apply (i.e. 10-10-10).
3. Calculate the amount of product needed to supply 1 pound of nitrogen per 1,000 square feet. We know that a full bag of fertilizer contains 100 percent of something (nitrogen + phosphorus + potassium + filler), so to figure out the specific pounds of a particular nutrient



Figure 6. Measuring the effective width of spread for a drop spreader. The width is determined directly below the hopper, between the yellow lines.

in the bag, we need to divide the total percent of everything in the bag (100) by whatever percent the nutrient may be (in our example, it is 10%).

$$\begin{aligned} &100\% \text{ bag of fertilizer} \div 10\% \text{ N in the bag} = \\ &10 \text{ lb product needed to deliver} \\ &1 \text{ lb N/1,000 sq ft} \end{aligned}$$

4. Determine the effective width of spread. This determination is very easy on a drop spreader as you merely measure the width of the spreader (Figure 6). If you own a 3-foot drop spreader, the effective width of spread is 3 feet. This distance is measured inside the wheels directly under the hopper. For a rotary spreader, this step is a little more involved and is more easily accomplished with several people. Place a little of the material you plan to apply into the fertilizer hopper and have a person stand on either side of the spreader. Start walking, open the hopper, and walk a few steps. Have the person on each side of the spreader spot the furthest thrown particle and run a tape measure between them. We must account for the fact that rotary spreaders do not throw material evenly (more is thrown close to the spreader). A common rule of thumb for effective width of spread is to assume that the majority of particles are thrown within 75 percent of the total throw width. For example, if the actual throw was 12 feet, multiply 12 feet x 0.75 (75%) and get 9 feet as the effective width of spread. This means that most of the fertilizer will be applied within 9 feet (Figure 7). Determining this measurement may also be accomplished without the help of others by throwing fertilizer

on a hard surface or a tarp and measuring the distance between the furthest thrown particles. If using this method, try to notice if the fertilizer is bouncing on the hard surface and throwing further for best accuracy. Also, if using a hard surface for calibration, be sure to sweep up the applied fertilizer to minimize any negative environmental effects.

5. Once the effective width of spread is determined, you can lay out a test course. Ideally, find a space that is not the focal point of the lawn to set up the test course. The course can be any length but is probably more accurate with longer lengths. So, for example, let's say the length of the course will be 25 feet. You will lay this length out with your walking wheel or measuring tape. If the length of the course is 25 feet and we have already determined from the effective width of spread calculation that the width is 9 feet, the total area of the test course will be 25 feet (length) x 9 feet (width) = 225 square feet. Now that we know the area of the test course, we need to figure out how much fertilizer should be applied in that area. To accomplish this calculation, we take the amount of fertilizer we calculated in step 3 and convert it from 1,000 square feet to 225 square feet. To do this we must cross-multiply.

If 10 pounds of product covers 1,000 square feet, how many pounds of product covers 225 square feet? We set up this calculation as follows:

$$\frac{10 \text{ lb of product}}{\text{x lb of product}} = \frac{1,000 \text{ sq ft}}{225 \text{ sq ft}}$$

Cross-multiplying gives us:

$$10 \text{ lb product} \times 225 \text{ sq ft} = 2,250$$

We then divide this by 1,000 square feet to calculate the amount of pounds needed:

$$2,250 \div 1,000 = 2.25 \text{ lb}$$

So, we will apply 2.25 pounds of product per 225 square feet.

6. You now know how much product needs to be applied in your test area. The next step can be summed up as trial and error. With a scale and a bucket, weigh out three to four times the amount needed to cover the test area. In our example, we would weigh 6.75 pounds ($3 \times 2.25 \text{ lb}$) of fertilizer into the bucket. If you do not have a scale that allows you to measure decimals, simply round up to the next highest number. Pour this known amount of product into the spreader. If the fertilizer you purchased has a guideline for setting, set the spreader as directed. If you do not have any application information, start by setting the spreader

somewhere in the middle (Figure 8). Take the spreader to your test course, begin walking at a pace that is comfortable and repeatable, and walk toward the starting point. When you reach the starting point, open the hopper, walk to the end of the course, and close the spreader. You will then dump the fertilizer that is remaining in the hopper back into the bucket to weigh how much fertilizer is remaining. Let's say that there are 3.5 pounds remaining in the spreader. By subtraction, you can determine that 3.25 pounds was applied over the test area ($6.75 \text{ lb initial} - 3.5 \text{ lb remaining} = 3.25 \text{ lb applied}$). The goal was to apply 2.25 pounds over the test area, so more fertilizer was applied than needed. Pour the fertilizer back in the hopper and adjust the setting on the spreader to a smaller opening. Repeat the test course, re-weigh the remaining fertilizer, and determine whether the amount applied was 2.25 pounds. If not, change the setting again, and walk the test course again. Typically, the correct rate is determined by the third pass over the test course. To avoid over-fertilization of the test course area, you may want to

perform the test in an out-of-the-way area or in several different places around the yard. You may also perform these steps on a large tarp and collect the fertilizer following calibration.

Drop spreaders are calibrated exactly the same as rotary spreaders with the exception that the width is generally smaller. If we used a 3-foot (our effective width) drop spreader on a course 25 feet long, the test area would be 75 feet. Use this measurement to calculate the amount of fertilizer needed for the test area (as shown above). The trial and error process still applies for drop spreaders; however these spreaders often come with a catch pan making it easy to collect the fertilizer being applied. If your spreader does not have a catch pan, one can be made using plastic rain gutter.

Once the correct weight has been achieved, the spreader is calibrated and you are ready to fertilize. Be sure to record the setting information if you plan to use the same fertilizer in the future.

Photos by Gregg Munshaw.



Figure 7. Measuring the effective width of spread for a rotary spreader. The total width (between the yellow lines) is multiplied by 0.75 as most of the fertilizer is thrown within 75 percent of the total width (between the white lines).



Figure 8. Choosing a middle setting for the spreader is a good starting point.

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