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A No-Math Method of Calibrating Backpack Sprayers and Lawn Care Spray Guns

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Calibrating application equipment is something many people avoid because they believe it is too time consuming or that the math involved in the process is confusing. Calibration, however, is critical. Applying too much can be bad for the environment, injure the grass, and also wastes money. Applying too little can result in poor pest control and can lead to pesticide resistance. There are several methods that will calibrate sprayers but the no-math method is likely the most simple and reduces the chance of errors.

The no-math method is based on the number 128. This method is also called the 1/128th method because it is known that there are 128 fl. oz. in a gallon and the calibration covers 1/128th of an acre (340 sq. ft.).

To calibrate using the no-math method, only very simple equipment is needed:

- Backpack sprayer
- Measuring tape
- Measuring container (in fl. oz.)
- Stopwatch

The following steps are required to calibrate a backpack sprayer[1] using the no math method:

1. Measure out a square that is 18.5 ft. x 18.5 ft. (340 sq. ft.). Ideally, this will be on concrete as it is easier to see where you have sprayed on concrete rather than grass. Pay attention to your speed, however, as you may walk faster on the hard surface compared to the grass.
2. Fill the spray tank about half full with water and have someone time how long it takes you to spray the entire area. Be sure to keep the spray tank pressure constant throughout calibration and your nozzle at a consistent height at which you typically operate it (Figure 1).
3. Spray the nozzle into the measuring container for the same amount of time as it took to spray the square (Figure 2).
4. Repeat steps 2 and 3 to make sure your speed and nozzle outflow are consistent.
5. Whatever amount is collected in the container, measured in ounces, is the GPA. If you collected 40 fl. oz. in your measuring container, this number converts directly to 40 gallons per acre (GPA), 30 fl. Oz. is 30 GPA, etc.

Figure 1. Timing how long it takes to spray an 18.5 ft. by 18.5 ft. square.

The previous steps are all that are required to calibrate a sprayer. However, we now need to know how much pesticide must be added to the tank to make sure the proper rate is being applied. To do this, first locate the rate on the pesticide label. For example, we will use an herbicide that is to be applied at 1 quart per acre, we calibrated our sprayer to 30 GPA, and our spray tank can hold 3 gallons of liquid. Because backpack sprayers are not typically used to cover large areas like an acre and because the spray tanks are quite small, we need to convert the rate from quarts to a much smaller value like fluid ounces. To do this, we plug our numbers into the following formula:

$$\frac{\text{spray tank size (gallons)}}{\text{GPA}} \times \text{pesticide rate per acre} = \text{amount of pesticide required in sprayer}$$

Plugging in our numbers we get the following:

$$\frac{3}{30} = 0.1 \times 1 \text{ quart} = 0.1 \text{ quarts}$$

[1] To calibrate a lawn care spray gun, these same steps are used but the tank does not have to be half filled.

Because most measuring containers use fl. oz., we can then convert this number into fl. oz. by multiplying by 32 fl. oz. in a quart:

0.1 quarts x 32 = 3.2 fl. oz.

This equation also works for large lawn care spray-gun tanks.

If the pesticide is a dry formulation like a WP or DG, the same formula applies. As long as the rate is in oz. per acre, we can still plug this number into the space for pesticide rate per acre in the formula. The total amount of pesticide can also be converted into grams or any units that are desired.

Table 1 can be used to determine how much pesticide (in fl. oz.) should be added to the spray tank based on the size of your specific sprayer and the GPA you determined during calibration.

This formula is all there is to calibrating using the no-math (technically very little math) method. Calibration is something that should ideally be done each time you apply pesticides to make sure you are applying properly. Using this method is fast and easy enough that there really are no good excuses for skipping this step. With a little practice, you can be a calibration expert in no time.

Figure 2. Spraying into the measuring container for the same length of time it took to spray the square.

Table 1. The amount of pesticide to be added to the tank based on the calibrated GPA, the tank size, and the pesticide rate per acre.

Calibration	Tank Size (gal)	Pesticide Rate per Acre				
		1 pt	1 qt	2 qt	3 qt	4 qt
		Amount of Pesticide to Add to Tank (fl.oz.)				
20 GPA	1	0.8	1.6	3.2	4.8	6.4
	2	1.6	3.2	6.4	9.6	12.8
	3	2.4	4.8	9.6	14.4	19.2
	4	3.2	6.4	12.8	19.2	25.6
30 GPA	1	0.5	1.1	2.1	3.2	4.3
	2	1.0	2.1	4.2	6.4	8.6
	3	1.5	3.2	6.3	9.6	12.9
	4	2.0	4.3	8.4	12.8	17.2
40 GPA	1	0.4	0.8	1.6	2.4	3.2
	2	0.8	1.6	3.2	4.8	6.4
	3	1.2	2.4	4.8	7.2	9.6
	4	1.6	3.2	6.4	9.6	12.8
50 GPA	1	0.3	0.6	1.3	1.9	2.6
	2	0.6	1.2	2.6	3.8	5.2
	3	0.9	1.8	3.9	5.7	7.8
	4	1.2	2.4	5.2	7.6	10.4

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