



Calibrating Backpack Sprayers

The goal of sprayer calibration is to make sure the sprayer is delivering the proper amount of chemical as recommended on the pesticide label. Do your calibrations with WATER, not your chemical mixture.

Items you will need:

Sprayer, gauges, wand, etc.
Stopwatch
1-gallon container
Water
Measuring tapes (12-ft and 50-100 ft), pin flags or other markers
Paper and pen
Calculator
Wrench, screwdriver
Gloves (latex, nitrile)
Extra nozzles, filters, replacement parts, plumbers tape, etc.

Make sure the sprayer is operating properly.

- Make sure the nozzle(s) is spraying cleanly and properly. If not, check the filters and the nozzles to make sure they are clear of debris. Make sure the nozzle is producing the pattern you want. If the nozzles or filters are old or worn (or if you even suspect they are), replace them before starting the calibration process. This will save you a lot of time and frustration.
- Select the pressure for the spray emission (if unsure, target 32-35 psi). Fill the tank at least halfway full with water. Test the wand and sprayer to make sure the gauge is reading at the desired pressure. If needed, adjust the pressure screw to get the pressure to the proper PSI.

1) Determine the TIME needed to cover a known distance and SPRAY SWATH:

- a. Select a surface where you can see where you have sprayed (e.g. driveway or dry ground) and measure a 100-ft path (or some known distance). Use the pin flags to mark the Start and Finish points.
- b. Fill the sprayer halfway with water and adjust the pressure to your target PSI.
- c. When you are ready, start the timer and sprayer and start walking. Walk the 100-ft path at the same pace as you will be doing when spraying on the bog. Hold the nozzle at a consistent height; for most people, a comfortable height is 18-24 inches above the ground.

- d. Stop the timer when you cross the 100-ft marker and write the time (to the nearest second) on the worksheet.
- e. Measure the Effective Swath Width (ESW), the width of wetted ground, at several points along the 100-ft path. Record the number on the worksheet.
- f. Walk the 100-ft path 3 more times. Using the worksheet, add up the numbers from your 4 “walks” and calculate the average time required.

2) Determine the AREA covered per minute, assuming a 100-foot long path:

Average ESW (inches) ÷ Average time (seconds) to walk 100 ft × (0.0114) = acres/minute

Assume your walk times were 23, 25, 23, and 24 seconds (for an average of 23.75 sec) with a 24-inch swath:

$$(24/23.75) \times (0.0114) = \underline{0.0116 \text{ acres/minute}}$$

3) Determine spray OUTPUT:

- a. Spray water into a 1-gallon container (a wide-mouthed container). Using the worksheet, record the amount of time needed, to the nearest second, to fill the jug. Repeat 3 more times and calculate the average time needed to spray out 1 gallon of water.
- b. Determine average gallons per minute. For example, if your times were 350, 338, 335, and 340 sec giving an average of 340.8 sec/gal:

$$(60 \text{ sec/minute}) \div (\text{Average sec/gal}) = 60 \div 340.8 \text{ sec} = \underline{0.176 \text{ gal/minute}}$$

Note: if you want to save some time, spray into a 1-quart container. Multiply your numbers by 4 (to get back to seconds per gallon) and then use the formula above.

4) Determine Gallons per Acre (GPA) using numbers from #2 and #3 above:

$$(0.176 \text{ gal/minute}) \div (0.0116 \text{ acres/minute}) = \underline{15.17 \text{ gal/acre}}$$

5) Determine the AREA that can be sprayed by your sprayer for each tankful (assuming your tank holds 5 gallons):

$$(5 \text{ gallons/tank}) \div 15.17 \text{ GPA} = \underline{0.33 \text{ acres/tank}}$$

USE THE ATTACHED WORKSHEET TO HELP WITH MAKING YOUR CALCULATIONS.

Hilary Sandler, May 2015

Portions of the fact sheet taken from Zedaker, S.M. 2014. Calibrating hand-held and backpack sprayer for applying pesticides. Virginia Tech, Publication 456-502.



BACKPACK SPRAYER CALIBRATION WORKSHEET

1. Determine the Time to cover a known distance and Spray Swath:

Run	Distance (ft)	Effective Spray Swath (inches)	Time to walk distance (sec)
1			
2			
3			
4			
SUM			
AVERAGE		[A]	[B]

2. Determine the Area covered per minute, if using 100-ft path:

Divide the number in (A) by the number in (B) and multiply by 0.0114.
 (Note: if you use a 50-ft path, multiply by 0.0057.)

$$(A/B) \times 0.0114 = \text{acres/minute}$$

$$(\quad [A] \div \quad [B] \times 0.0114 = \quad [C] \text{ acres/minute}$$

3. Determine Spray Output:

Run	Container (gal)	Time to fill jug (seconds)
1		
2		
3		
4		
SUM		
AVERAGE		[D]

Note: if using less than 1-gal container, multiply back up to get a "1-gallon rate". For example, if using 1-quart container, multiply your time (sec) by 4 before proceeding to next step.

Divide 60 by the number in (D) to get gallons/minute.

$$60 \div (D) = \text{gallons per minute}$$

$$60 \div [D] = [E] \text{ gallons/minute}$$

4. Determine Gallons per Acre (GPA):

Divide number from [E] by the number from [C].

$$[E] \div [C] = [F] \text{ gal/acre}$$

5. Determine how much AREA you can treat with your tank

Divide the capacity of your tank (gallons) by the number from [F].

$$(\text{size of sprayer in gallons}) \div [F] = \text{acres/tank}$$