



# Sprayer Calibration

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Sprayer calibration is extremely important for accurate and effective spraying, yet, a recent study by a national farm magazine found that most sprayers were not applying the amount of chemical that the producers reported.

The cost of many new products is expensive and the application of the correct amount of chemical is critically important to the effectiveness of the product. Too much product could mean crop injury, while too little generally results in poor performance of the chemical.

There are several commercially available calculators and/or measuring devices, however, the following method is fast, and does not require any math computations or a calculator. The method is a simple yet accurate method of sprayer calibration. It can be used for both band and broadcast applications, using single or multiple nozzles of any spacing on a tool bar or band width. The method is based of a relationship between fluid ounces in a gallon and the number of square feet in an acre.

## Broadcast or Band Spray Calibrations

**STEP 1.** For *broadcast* spraying, measure (*in inches*) the distance between the spray nozzles, or the width of the spray pattern, then use the table below to determine the calibration distance to travel.

(For *band* applications, measure the width of the sprayed band in inches.)

Nozzle Spacing or Nozzle Spray Width in Inches	Calibration Distance in Feet
48	85
40	102
38	107
36	113
34	120
32	128
30	136
28	146
24	170
20	204
18	227
14	292
12	340

(To determine the calibration distance for a nozzle spacing or band width not listed, divide the spacing (expressed in feet  $\div 12$ ) into 340. This figure will give you 1/128 of an acre.)

Example: Calibration distance for 19 inch nozzle spacing is:  
**340 divided by 19/12 = 215 feet**

**STEP 2.** Mark off the distance in the area to be sprayed, and with all attachments operating or pulling, and the throttle (RPMs) and gear set, accurately record the time it takes to travel the correct calibration distance. Do this twice for accuracy.

**STEP 3.** With the equipment sitting still, the spray tanks filled with clean water (no chemical) and the engine and sprayer pump running at the previously marked RPMs, turn on the sprayer and pressurize the system to the desired pressure.

**STEP 4.** Catch the water from one nozzle (or group of nozzles for applications using more than one nozzle per sprayed width (i.e. 3 nozzles/row for defoliation)) using the same amount of time (*in seconds*) that was needed to travel the calibration distance as noted in step 2. The number of fluid ounces collected equals the number of gallons applied per TREATED acre.

**STEP 5.** Repeat steps 3 and 4 with different nozzles to check for worn or stopped up nozzles. Use an average of the nozzles to determine the rate per TREATED acre. As a standard rule, if a nozzle is varying more than 10% from the normal, the nozzle should be replaced.

### Example

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You want to apply a preplant herbicide broadcast. The nozzle spacing on the boom is 20 inches and you are using 8003 nozzle tips.

**STEP 1.** The calibration distance from the chart is 204 feet.

**STEP 2.** With the gear, throttle, and RPMs noted, and the equipment at full speed before crossing the start line, record the time necessary to go to the calibration distance. After doing it twice for accuracy, you found that it took 58 seconds to travel the 204 feet.

**STEP 3.** With the equipment sitting still, and using the same RPMs as during the timing, set the pressure to the desired setting, turn on the spray rig and catch the spray for 58 seconds. After measuring, you found that

17 fluid ounces of liquid was collected. The spray rig is applying 17 gallons of water per acre.

**STEP 4.** You have a 200 gallon tank and want to apply 1 qt. of product per acre.

**200 gal./17 gal. per ac. = 11.74 ac/tank**  
**11.75 acres/tank x 1 qt./ac. = 11.75 qts. of herbicide/tank\***

*\*NOTE: A wettable powder will often cause a slight decrease of water applied per acre. Gallons per acre may need to be adjusted slightly. After adding a product to the tank, check the nozzle rate again as in steps 3 & 4.*

### Band Application

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For band applications, measure the width of the spray band and use the band width to determine the calibration distance. The amount of water (*in ounces*) caught will be NUMBER OF GALLONS PER TREATED ACRE. The only difference in band applications is that the calibration distance often becomes quite far. Divide the distance by two or three for a reduced distance. Be sure to remember to multiply the fluid ounces caught by the same number you divided by to get the proper gallons per TREATED acre.

### Example

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A producer is spraying a 12 inch band behind a planter on 40 inch centers. How many gallons of water per TREATED acre is being applied.

**STEP 1.** Forget about the row spacing, the important number is the 12 inch band that will actually be sprayed.

**STEP 2.** From the calibration distance chart, select the calibration distance of 340 feet for a 12 inch spacing.

**STEP 3.** Accurately measure the time to travel the 340 feet as previously stated. The time is 57 seconds.

**STEP 4.** Collect the spray for 57 seconds. The number of fluid ounces caught is 15.

The producer is applying 15 gallons of water to each treated area. The producer has a 200 gallon tank on the tractor.

$$200 \text{ gallons} / 15 \text{ gallons/ac.} = 13.3 \text{ TREATED AC./tank}$$

The producer needs to apply 1 pint per TREATED ACRE. So put 13.3 pints in the tank.

The producer will drive over 44 land acres to apply the material to 13.3 actual TREATED acres in the 12 inch bank.

**NOTE:** *There is often some confusion about interpreting and converting broadcast rates to band rates and sprayer calibration. Using per TREATED acre rates is less confusing. The rate per TREATED acre remains the same, regardless if the material is sprayed in a band or broadcast, calculations are made on the amount of soil actually sprayed.*

### Example

The rate of a chemical to be applied is 1 pint per acre. (Per acre is understood to mean per TREATED acre.) The nozzles are spaced 40 inches apart behind a planter.

**STEP 1.** Using the distance calibration chart, the measured distance will be 102 feet. Although the nozzles will not spray 40 inches, this will give a broadcast rate of spray.

**STEP 2.** After following all the calibration steps, the fluid ounces caught is 4.75 or 4.75 gallons per acre broadcast.

**STEP 3.** To convert this number to a 12 inch band,  $3.33 \times 4.75$  (broadcast spray rate) = 15 gallons of water per TREATED acre. (4.75 gallons sprayed over 40 inches and squeezed into a 12 inch band equals 15 gallons in the band.)

This producer will be driving over 3.33 times more land than he is actually spraying. Out of a 50 acre field, he will spray only 15 TREATED acres.

$$40 \text{ (inch spacing)} / 12 \text{ (inch band)} = 3.33 \text{ (there are 3.33, 12 inch bands in a 40 inch row spacing)}$$

With a little practice, any rig can be calibrated in just a matter of minutes.

## Boomless Sprayers

To calibrate a boomless or “rooster tail” sprayer commonly used in pastures or when spraying around brush, these are the steps to be taken:

**STEP 1.** Measure the “effective” spray width.

**STEP 2.** Use the following spray calibration chart to determine the length of the course use.

Swath Width in Feet	Calibration Distance in Feet
35	157
40	136
45	121
50	109

(To determine the length of a calibration distance for a swath width not listed, divide 5460 square feet (1/8 acre) by the swath width in feet. Example: Calibration distance for 32 foot swath width is 5460 divided by 32 = 171 feet.)

**STEP 3.** Drive the course with all the equipment operating and in the gear, pressure and r.p.m.'s you will use when actually spraying. Record the time (*in seconds*) to drive the course. Do this twice and average the time.

**STEP 4.** Park the tractor and maintain the same r.p.m and pressure.

**STEP 5.** Place an old inner tube or trash bag over the nozzle to catch the water out of the spray head. Turn on the sprayer for exactly the same number of seconds required to drive the calibration course.

**STEP 6.** The pints of water caught is equal to the gallons per acre of spray material you will apply when spraying.

## NOTES

The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Cooperative Extension Service is implied.