

Calibration of Boom Sprayers

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As stated on the pesticide label – the sprayer needs to be calibrated before you spray!

Proper calibration of sprayer equipment is the only way to ensure spray applications are effective, efficient, and economical. Poor spray coverage is the primary cause of reduced spray product performance. Regular care and maintenance will ensure the sprayer is residue-free and serviceable when needed.

A sprayer should never be operated without first checking the calibration for the following reasons:

1. To determine the precise rate of material applied per acre.
2. To ensure each nozzle tip is operating at the manufacturer's specification.
3. To compensate for equipment changes, crop staging, and environmental conditions.

Calibration Factors Affecting Application Rate

- Ground Speed

A uniform ground speed is necessary to maintain even spray application. The spray application per acre varies inversely with the ground speed of the sprayer. If the ground speed is doubled the application rate is cut in half and as the ground speed is reduced to half, the spray application is doubled. Rate controllers can only compensate for this within certain limits and can sometimes have a negative impact on spray quality.

- Nozzle Flow Rate

The flow rate through the nozzle varies with the tip size, the pressure applied, and the condition of the tip.

Calibration Notes

Recording your sprayer calibration calculations for future use is important. By having a record, you can compare your sprayer calibration calculations from calibration to calibration. This information can be useful the next time you check the calibration. This recordkeeping is also due-diligence and is important to have on hand if ever a question arises about product residue, pesticide drift, or any other spray complaint.

A Quick and Easy Method to Accurately Calibrate a Low Pressure Boom Sprayer

1. Measure the distance between nozzles in inches. For a boom sprayer that has nozzles placed 20" apart, measure off a distance of 204 feet on a field similar to that which you will spray (e.g., sod, disked, etc.). The correct distance of travel for other nozzle spacings is as follows:

<u>Nozzle Space</u>	<u>Travel Distance*</u>
16 inches	256 feet
17 inches	239 feet
18 inches	227 feet
19 inches	215 feet
20 inches	204 feet
21 inches	194 feet
22 inches	185 feet
23 inches	177 feet
24 inches	170 feet
25 inches	163 feet

* 340 feet/nozzle space in feet = distance

2. Drive the tractor the correct distance shown above and note the exact time in seconds it takes to pass the end points. Make a return pass and check the time again. If the time differs by no more than 2 seconds, average the two times. Repeat if the time differs by 3 seconds or more. Note the engine RPM and gear that were used to make the passes.
3. With the tractor in a stationary position set the same engine RPM used in Step 2. Also set the application pressure (30-40 psi) that you normally use and spray water through the boom. Do the spray patterns from all the nozzles look uniform? If not, the tips should be removed and check for wear or blockage. Collect spray at the nozzles when all the nozzles appear to have a uniform delivery at the desired psi. The container(s) should be quickly placed under the nozzle(s) for the exact number of seconds noted in #2 above.
4. The ounces collected per nozzle for the exact number of seconds equal the rate of spray per acre in gallons. (Example: If 18 ounces are collected in the time noted in #2 above, you are spraying 18 gallons per acre from that nozzle). Collect from other nozzles and replace any tips that vary by more than 10% (or 2 ounces with the example stated).

Boom Sprayer Calibration Worksheet

Retain the following information for your records:

Date _____

Farm _____ Operator _____ Phone _____

Address _____ Town _____ State _____ Zip code _____

Sprayer and Tractor Identification Sprayer _____ Tractor _____

Calibration

1. Measure the distance between nozzles in inches.

Distance between nozzles _____ Travel Distance _____

2. Drive the tractor the correct distance shown above and note the exact time in seconds it takes to pass the end points. Make a return pass and check the time again. If the time differs by no more than 2 seconds, average the two times. Repeat if the time differs by 3 seconds or more. Note the engine RPM and gear that were used to make the passes.

Tractor RPM _____ Gear _____

Time in seconds – down _____ time in seconds – back _____ Average Time in seconds _____

$$\text{Miles per Hour} = \frac{\text{Distance in Feet} \times 60}{\text{Time in Seconds} \times 88} = \left(\frac{\text{Feet}}{\text{Seconds}} \right) \times \frac{60}{88} = \text{_____} = \text{_____ MPH}$$

3. With the tractor in a stationary position set the same engine RPM used in Step 2. Also set the application pressure (30-40 psi) that you normally use and spray water through the broom. Collect spray at the nozzles when all the nozzles appear to have a uniform delivery at the desired psi. The container(s) should be quickly placed under the nozzle(s) for the exact number of seconds noted in #2 above.

Pressure _____ PSI
 Number of Nozzles on Boom _____
 Type of Nozzle _____
 Size of Tip _____
 Height of Boom from Target _____
 New Nozzle Tip's Output _____

Nozzle Output			Nozzle Output		
Nozzle #	Tip Size	Output in Fluid Ounces	Nozzle #	Tip Size	Output in Fluid Ounces
1			11		
2			12		
3			13		
4			14		
5			15		
6			16		
7			17		
8			18		
9			19		
10			20		
		Output			Output
					Total Output

(Looking at the sprayer from behind, #1 nozzle is on left side)

$$\text{Average output} = \frac{\text{Total Output in fluid ounces}}{\text{Total number of nozzles}} = \frac{\text{_____ fluid ounces}}{\text{_____ nozzles}} = \text{_____ fluid ounces (Average Output)}$$

$$\text{Minimum Output} = 0.95 \times \text{_____ Average Output} = \text{_____ Fluid ounces}$$

$$\text{Maximum Output} = 1.05 \times \text{_____ Average Output} = \text{_____ Fluid ounces}$$

Replace nozzles if output is greater than 10% variation between nozzles.

Replace all nozzles if average output is 15% more than a new nozzle's output (from manufacturer's chart or discharge test).

The ounces collected per nozzle for the exact number of seconds equal the rate of spray per acre in gallons.
 _____ **GPA**
 (Example: If 18 ounces are collected in the time noted in #2 above, you are spraying 18 gallons per acre from that nozzle).