

Herbicide Sprayer Calibration Worksheet

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Calibration is simply the accurate determination of the spray volume delivered by the sprayer and verification that the spray pattern is correct. A sprayer that is not properly calibrated may result in wasteful and harmful over-application of the herbicide, or reduced effectiveness due to under-application. Herbicide sprayers should be calibrated at least once per season, more often if the sprayer is used frequently.

Materials Needed:

- 100 ft tape measure
- Stopwatch
- Containers to catch nozzle output, calibrated in fluid oz.
- Chemical resistant gloves
- Labels or tape, pen or pencil
- Calculator
- Wrenches
- Spray nozzle catalogue

1. Check nozzle operation and spray pattern.

- a. Determine if nozzles are appropriate style for upcoming application
- b. For broadcast application, all nozzles should be the same style and size
- c. Clear plugged nozzles and nozzle screens
- d. Adjust nozzle orientation and boom height for correct coverage.

2. Determine nozzle output

- a. Fill spray tank with clean water
- b. Operate the sprayer at nozzle manufacturer's standard operating pressure (usually 40 psi)
- c. Collect spray output from each nozzle for exactly 15 seconds
- d. Measure spray output from each nozzle and multiply by 4 to determine nozzle output in gallons/minute (usually a fraction of a gallon/minute)

Nozzle	Output 15 sec (fl oz)	Multiply by 4	Equals Output (fl oz/min)	Divide by 128 fl oz/gal	Equals Output (gal/min)
1		X 4	=	÷ 128	=
2		X 4	=	÷ 128	=
3		X 4	=	÷ 128	=
4		X 4	=	÷ 128	=
					Average =

- e. Replace nozzles that are off-type or those having output 10% greater than the manufacturer's output rating for the nozzle at standard pressure
- f. Repeat nozzle output check after replacing nozzles
- g. Calculate and record average nozzle output

Average Nozzle output _____ gal/min

3. Determine width of spray application

- a. Broadcast: width of combined spray pattern of all nozzles
- b. Band: width of individual nozzle spray pattern

Spray width _____ ft

4. Determine tractor speed

- a. Determine tractor speed by operating tractor over a measured course within the vineyard using your preferred gear and throttle settings, spraying water at standard pressure. Record gear and throttle settings, and spray pressure.

Gear _____ Throttle _____ rpm Pressure _____ psi

- b. Measured course can be a full vineyard row of measured distance or a course of defined length such as 100 ft
- c. Record the time required to travel the measured course while spraying water

Tractor speed _____ ft/min

5. Calculate sprayer output

$$\frac{\text{Nozzle output (gal/min)} \times \text{no. nozzles} \times 43,560 \text{ ft}^2/\text{acre}}{\text{Tractor speed (ft/min)} \times \text{Spray width (ft)}}$$

$$\frac{\text{_____ gal/min} \times \text{___ (no. nozzles)} \times 43,560 \text{ ft}^2/\text{acre}}{\text{_____ ft/min} \times \text{_____ ft}} = \text{gal/acre}$$

Sprayer output: _____ gal/acre

6. Determine if sprayer output is appropriate for the herbicide product
 - a. Refer to the directions for use on the herbicide label to determine acceptable range of spray mixture (herbicide plus water) application volume (gal/acre)
 - b. If calibrated sprayer output is outside the herbicide's acceptable range, sprayer must be recalibrated prior to the application
 - c. Large changes in sprayer output are made by changing nozzle size
 - d. Repeat steps 1-5 if nozzles are replaced
 - e. Small changes in sprayer output can be made by adjusting tractor speed
 - f. Repeat steps 4 and 5 if tractor speed is changed
 - g. Small reductions in sprayer output also can be made by lowering spray pressure, but pressure must be within the nozzle manufacturer's recommended range or the spray pattern will be incomplete, resulting in poor coverage
 - h. Nozzles should never be operated at pressure greater than recommended by the manufacturer; spray pattern will be disrupted and excessive spray drift will occur
 - i. Repeat steps 1-5 if pressure is adjusted

7. Calculate total spray mixture volume

- a. Determine the area (acres) to be treated with herbicide.
- b. If a band application is to be made to the vine row, the area to be treated is a fraction of the full vineyard acreage:

$$\text{Vineyard acreage} \text{ ____ } \times \frac{\text{width of band (ft)}}{\text{Row spacing (ft)}} = \text{ ____ } \text{ acres } \textit{treated area}$$

- c. If a broadcast application is to be made to the alleyway or cover crop, the area to be treated is a fraction of the full vineyard acreage

$$\text{Vineyard acreage} \text{ ____ } \times \frac{\text{width of alleyway (ft)}}{\text{Row spacing (ft)}} = \text{ ____ } \text{ acres } \textit{treated area}$$

- d. Spray mixture volume (gal) = Sprayer output (gal/acre) X Treated area (acres)

Spray mixture volume (gal) = ______ gal/acre X ______ acres

8. Determine area covered by one full spray tank

Sprayer tank capacity _____ gal

$$\begin{array}{l} \text{Treated Area covered} \\ \text{by full spray tank (acres)} \end{array} = \frac{\text{Sprayer tank capacity (gal)}}{\text{Sprayer output (gal/acre)}}$$

$$\begin{array}{l} \text{Treated Area covered} \\ \text{by full spray tank} \end{array} = \frac{\text{_____ (gal)}}{\text{_____ (gal/acre)}} = \text{_____ acres}$$

9. Preparing the Spray Mixture

$$\begin{array}{l} \text{Treated Area covered} \\ \text{by full spray tank} \end{array} \text{ _____ acres} \quad \times \quad \begin{array}{l} \text{Herbicide rate} \\ \text{(from label)} \end{array} \text{ _____ (pints, oz per acre)}$$

EXAMPLE 1. Many Acres To Treat

Area 14.0 acres
 Sprayer output 22.8 gal/acre
 Spray tank capacity 80 gallons
 Herbicide rate 4 pints/acre

$$\begin{array}{l} \text{Treated Area covered} \\ \text{by full spray tank} \end{array} \text{ 3.5 acres} \quad \times \quad \begin{array}{l} \text{Herbicide rate} \\ \text{(from label)} \end{array} \text{ 4 pints per acre}$$

3.5 acres X 4 pints/acre = 14 pints herbicide plus water to make 80 gal spray mixture

14 acres ÷ 3.5 acres (full tank coverage) = 4 full tanks needed to cover 14 acres

EXAMPLE 2. Small Acreage To Treat or Partial Tank

Area 1.3 acres
 Sprayer output 22.8 gal/acre
 Spray tank capacity 80 gallons
 Herbicide rate 4 pints/acre

1.3 acres X 4 pints/acre = 5.2 pints herbicide

1.3 acres X 22.8 gal/acre = 29.6 gal spray mixture (herbicide plus water)