AgriLIFE EXTENSION
Texas A&M System

Airblast Sprayer Calibration Worksheet

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Sprayer calibration should be done at least once per season, but preferably every time there is a significant difference in the desired spray volume (gal/acre). For example, early-season applications cover a small canopy and therefore require a lower spray volume for thorough coverage compared to later applications to a full canopy. This worksheet is intended to take you stepwise through the calibration process.

Materials Needed:

- Water-sensitive paper
- 100 ft tape measure
- Stopwatch
- Chemical resistant gloves
- Labels, pen or pencil
- Calculator
- Wrenches
- Spray nozzle catalog

1. Determine tractor speed.

Establish a preferred operating speed in a pre-set gear. Note gear and throttle settings. Fill the spray tank half full with water for a speed test. Insert numbers into the equation below and calculate the result.

A. Measure the length of a vineyard row selected for the test run. **(A)** ____ **ft.**

B. Determine the time required to travel the row at the preferred speed. **(B)** ____ **sec.**

Multiply the distance traveled in test run (A) by 60 sec/min
Divide the result by the time (B) required to travel the test distance

$$\frac{\text{(A) \_\_\_\_\_ ft. X 60 sec./min.}}{\text{(B) \_\_\_\_\_ sec.}} = \textbf{(C) \_\_\_\_\_ ft/min tractor speed}$$

2. Check spray pressure and spray pattern.

Fill the tank with water. Engage the fan, turn on the manifold, and make a test run in your vineyard at your preferred operating speed. Before you start, observe the spray pattern and turn off nozzles that do not spray the plant canopy. Record the pressure gauge reading while spraying.

Spray pressure = ____ psi

3. Check spray coverage

Effectiveness of fungicides and some insecticides is highly dependent upon good spray coverage to the grapevine canopy. Spray coverage is influenced by total spray volume applied per acre and airspeed produced by the fan. Total spray volume is determined by sprayer output per minute and tractor speed. The pesticide label will provide a range of spray volumes that are suitable for the product. Be aware that spray volume requirements will increase during the season, corresponding to the size of the canopy as shoots grow.

To test whether your sprayer is currently providing good coverage, place water-sensitive cards within several vines that have a typical-sized canopy that is representative of the vineyard. Be sure to place some cards in the fruit zone to evaluate coverage on the clusters. Cards should accurately represent cluster exposure, so do not remove leaves in front of water-sensitive cards and do not selectively place cards only in exposed cluster locations. Fill the sprayer with water and conduct a test run past the vines with water-sensitive cards using your established tractor speed, fan speed, and nozzle setup.

Evaluate spray coverage. If coverage is either inadequate or excessive to a small extent, you may be able to adjust tractor speed to attain proper coverage. Bigger changes will require adjustment of the target application rate

Target application rate (D) _____ gal/acre

4. Determine required total nozzle output in gal/min (gpm).

Fill in the following known quantities, insert into the equation below, and calculate the result.

(C) ____ ft/min. Preferred tractor speed, measured above.

(D) ____ gal/acre Target application rate per acre for thorough spray coverage determined above in step 3.

(E) ____ ft Distance between rows.

Calculate total required nozzle output in gpm:

Multiply the tractor speed (C) times target application rate (D) times distance between rows (E) Divide the result by the number of square feet per acre

$$\frac{\text{(C) \_\_\_\_ ft/min X (D) \_\_\_\_ gal/acre X (E)\_\_\_\_ ft}}{\text{43,560 sq ft/acre}} = \textbf{(F) \_\_\_\_ gal/min total required nozzle output}$$

5. Can the nozzles in your sprayer deliver the required output?
Determine the expected output of each nozzle from the manufacturer's catalog at your selected spray pressure (recorded above). Enter output in the spaces below. Enter a zero for nozzles turned off for the upcoming application.

Fill in nozzle output for only Left side for sprayers with one-sided delivery.

Fill in nozzle output for Left and Right side for sprayers with two-sided delivery.

Left side		**Right side**
Nozzle # 1 _____ gal/min		Nozzle # 1 _____ gal/min
Nozzle # 2 _____ gal/min		Nozzle # 2 _____ gal/min
Nozzle # 3 _____ gal/min		Nozzle # 3 _____ gal/min
Nozzle # 4 _____ gal/min		Nozzle # 4 _____ gal/min
Nozzle # 5 _____ gal/min		Nozzle # 5 _____ gal/min
Nozzle # 6 _____ gal/min		Nozzle # 6 _____ gal/min
Nozzle # 7 _____ gal/min		Nozzle # 7 _____ gal/min
Left total _____ gal/min	+	**Right total _____ gal/min = (G) _____ gal/min**
		Total expected output

Compare the total expected output with the total required output.

(F) _____ gal/min total required output
(G) _____ gal/min total expected output

If the difference between expected and required output exceeds 10 percent, replace with appropriate nozzle combinations that will provide the required output at your operating pressure. Keep in mind that all nozzles do not need to have equal output. You may want to have higher output nozzles pointing at the fruit zone of the vines. Remember that total expected output still must equal total required output, so use lower output nozzles elsewhere on the manifold. Repeat this procedure for nozzles on the other side of the two-sided sprayer.

6. What is the spray volume output of your sprayer?

Use one of the two methods below to determine the volume delivered by your sprayer.

Method I. Sprayer Field Run

With appropriate nozzles installed, fill the spray tank with water. Park the sprayer on level ground and mark the water level on the spray tank's sight gauge. Using your preferred tractor

speed with the airblast fan engaged and both sides spraying, make a trial application run down your vineyard test row. Return to the same place and position where you marked the sprayer water level. Using a calibrated 5-gallon container, measure the amount of water required to refill the tank to your mark on the sight gauge. Record as **(H)** test gallons applied.

Fill in the following known quantities, insert into the equation below, and calculate the result.

(A) ____ **ft** **Length of vineyard test row,** recorded above
(E) ____ **ft** **Distance between rows,** recorded above
(H) ____ **gal** **Test gallons applied**

Multiply the number of gallons applied (H) times the number of square feet per acre
Divide the result by the length of test row (A) times the distance between rows (E)

$$\frac{\text{(H) \_\_\_\_ gal X 43,560 sq ft/acre}}{\text{(A) \_\_\_\_ ft X (E) \_\_\_\_ ft}} = \textbf{(I) \_\_\_\_\_ gal/acre actual spray volume}$$

Method II. Stationary Sprayer Run

Partially fill the spray tank with water. Mark a line at the water level on the tank. Add exactly 5 gallons of water to the tank. Run the sprayer at your normal operating throttle and record the time required to deliver exactly 5 gallons, which is indicated by the spray tank water level returning to the marked line.

Divide the number of seconds per minute by the time required (seconds) to spray 5 gal
Multiply the result by 5 gal

$$\frac{\text{60 sec/min}}{\text{\_\_\_\_ sec}} \text{ X 5 gal} = \text{\_\_\_\_\_ gal/min output}$$

Multiply the gal/min output calculated above times the number of square feet per acre
Divide the result by tractor speed (C) times the distance between rows (E)

$$\frac{\text{\_\_\_\_\_ gal/min X 43,560 sq ft/acre}}{\text{(C) \_\_\_\_\_ ft/min X (E) \_\_\_\_\_ ft}} = \textbf{(I) \_\_\_\_\_ gal/acre actual spray volume}$$

7. Determine area covered by one full spray tank

Sprayer tank capacity (J) _____ gal

Area covered by full spray tank = $\frac{\text{(J) } \_\_\_\_\_ \text{ (gal)}}{\text{(I) } \_\_\_\_\_ \text{ (gal/acre)}}$ = **(K) _____ acres**

8. Prepare the spray mixture.

Pesticide rate from label **(L) _____ (lb, oz, or pint per acre)**

Area covered by full spray tank		Pesticide rate from label		Quantity of Pesticide
(K) _____ acres	X	(L)_____ (pints, oz per acre)	=	_____ (pints, oz, etc.)

EXAMPLE 1. Many Acres To Treat

Area	14.0 acres
Sprayer output	55.0 gal/acre
Spray tank capacity	400 gallons
Pesticide rate	3 pints /acre

7.3 acres X 3 pints per acre = 21.9 pints of pesticide with water to make 400 gal

14 acres ÷ 7.3 acres (full tank coverage) = 1.9 full tanks needed to cover 14 acres

EXAMPLE 2. Small Acreage To Treat or Partial Tank

Area	1.3 acres
Sprayer output	55.0 gal/acre
Spray tank capacity	400 gallons
Pesticide rate	3 pints/acre

1.3 acres X 3 pints/acre = 3.9 pints pesticide in spray mixture

1.3 acres X 55 gal/acre = 71.5 gal spray mixture (pesticide plus water)