

# Sprayer Calibration Reference Guide

## Step 1: Determine sprayer speed

Measure out a course in actual field conditions for a test run. A distance from 100 feet to 300 feet is adequate. Drive the course with the sprayer half-full of water and, using a stopwatch or watch with a second-hand, record the time required to drive the course. Repeat this twice for a total of three runs and average the time recorded.

Convert to miles per hour (MPH). Use the conversion chart on the backside of this sheet **or** calculate.

$$\frac{\text{distance in feet}}{\text{time in seconds}} \times 0.682 = \text{MPH}$$

Run 1 - \_\_\_\_\_ seconds

+

Run 2 - \_\_\_\_\_ seconds

+

Run 3 - \_\_\_\_\_ seconds

Total \_\_\_\_\_ ÷ 3 = \_\_\_\_\_ seconds

Speed in MPH = \_\_\_\_\_

## Step 2: Calculate nozzle flow rate in gallons per minute (GPM)

What is the desired application volume in gallons per acre? \_\_\_\_\_ GPA

What is the distance between nozzles\* (in inches) on the sprayer boom? \_\_\_\_\_ inches

What is the sprayer speed in miles per hour (MPH)? \_\_\_\_\_ MPH

Use the following equation to calculate nozzle flow rate in gallons per minute (GPM).

$$\frac{\text{GPA} \times \text{MPH} \times \text{spacing}}{5940} = \text{GPM} \quad \frac{\text{_____} \times \text{_____}}{5940} = \text{_____ GPM}$$

\* For banding applications, see explanation on back of this sheet.

## Step 3: Match nozzle size to calculated output

Select nozzles that match the flow rate (GPM) that was calculated in Step 2.

Example: An output of 0.4 GPM is needed for correct calibration. The nozzles currently in the sprayer are 11002 flat-fan. **Options:** 1) install larger-volume nozzles (11004) 2) decrease speed 3) decrease volume (GPA).

When selecting a nozzle size, consider the pressure operating range and sprayer speed. If possible, use a combination of larger nozzles, higher GPA, and lower pressure to reduce drift potential.

## Step 4: Collect output and adjust pressure

Install a new nozzle and strainer. Collect the output from this nozzle for 1 minute and record the amount collected in ounces. Convert to GPM by dividing by 128. Adjust pressure accordingly until amount collected matches GPM calculated in Step 3.

Large increases in pressure will result in small changes in nozzle output. To double the output, pressure must be increased by 4 times. Make sure pressure remains within range recommended by nozzle manufacturer.

## Step 5: Check output of all nozzles

Collect output from each remaining nozzle on the boom with the procedure outlined in Step 4. Compare the output of each nozzle against the newly installed nozzle and replace if output varies by more than 10%. If more than two nozzles vary by more than 10% consider replacing all nozzles on the spray boom.

## Banding Applications

**Single-nozzle banding:** Determine proper boom height for desired band width when using a single nozzle. This information can be found in the table below or the manufacturer's reference materials. Use the band width in place of nozzle spacing in the formula. Collect from the single nozzle as described in Step 4.

**Multiple-nozzle banding:** Divide the band width by the number of nozzles per row. Use this number in place of nozzle spacing in the formula. The GPM determined is for **each nozzle** of the banding unit. Collect from **each nozzle** separately as described in Step 4.

**Example:** Sprayer travels at 8 MPH and is applying 15 GPA using three-nozzle banding units in 15-inch bands. With the formula, the desired output is 0.1 GPM. This amount must be collected from each of the three nozzles.

### Speed Conversion Table

Speed in MPH	Time required in seconds to travel a distance of:		
	100 feet	200 feet	300 feet
0.5	136	273	409
1.0	68	136	205
1.5	45	91	136
2.0	34	68	102
2.5	27	55	82
3.0	23	45	68
3.5	19	39	58
4.0	17	34	51
4.5	15	30	45
5.0	14	27	41
5.5	-	25	37
6.0	-	23	34
6.5	-	21	31
7.0	-	19	29
7.5	-	18	27
8.0	-	17	26
8.5	-	16	24
9.0	-	15	23
9.5	-	14	22
10.0	-	-	20

### Theoretical Coverage at Various Spray Heights (in inches)

Spray angle	8"	10"	12"	15"	18"	24"	30"	36"
15°	2.1	2.6	3.2	3.9	4.7	6.3	7.9	9.5
20°	2.8	3.5	4.2	5.3	6.4	8.5	10.6	12.7
25°	3.5	4.4	5.3	6.6	8.0	10.6	13.3	15.9
30°	4.3	5.4	6.4	8.1	9.7	12.8	16.1	19.3
35°	5.0	6.3	7.6	9.5	11.3	15.5	18.9	22.7
40°	5.8	7.3	8.7	10.9	13.1	17.5	21.8	26.2
45°	6.6	8.3	9.9	12.4	14.9	19.9	24.8	29.8
50°	7.5	9.3	11.2	14.0	16.8	22.4	28.0	33.6
55°	8.3	10.3	12.5	15.6	18.7	25.0	31.2	37.5
60°	9.2	11.5	13.8	17.3	20.6	27.7	34.6	41.6
65°	10.2	12.7	15.3	19.2	22.9	30.5	38.2	45.8
73°	11.8	14.8	17.8	22.0	27.0	36.0	44.0	53.0
80°	13.4	16.8	20.2	25.2	30.3	40.3	50.4	60.4
85°	14.7	18.3	22.0	27.5	33.0	44.0	55.4	66.4
90°	16.0	20.0	24.0	30.0	36.0	48.0	60.0	72.0
95°	17.5	21.8	26.2	32.8	40.3	52.4	65.5	78.6
100°	19.1	23.8	28.6	35.8	43.0	57.2	71.6	85.9
110°	22.8	28.5	34.3	42.8	51.4	68.5	85.6	103
120°	27.7	34.6	41.6	52.0	62.4	83.2	104	
130°	34.3	42.9	51.5	64.4	77.3	103		
140°	43.8	54.8	65.7	82.2	98.6			
150°	59.6	74.5	89.5					

### Useful conversion factors

1 mile = 5,280 feet  
 1 acre = 43,560 ft<sup>2</sup>  
 1 rod = 5.5 yard  
 1 meter = 3.28 feet  
 1 mile = 1.609 kilometer

1 gallon = 4 quarts = 8 pints = 128 fluid ounces  
 1 gallon = 3.785 liters = 3,785 milliliters  
 1 fluid ounce = 29.6 milliliters  
 1 cup = 8 fluid ounces = 236 milliliters  
 1 pound = 16 ounces  
 1 ounce = 28 grams  
 1 pound = 454 grams