

Calibrating Sprayers

Single Nozzle Hand or Small Sprayers

Method 1:

1. Mark off an area 10 feet by 10 feet.
2. Fill sprayer to a known mark and spray the area.
3. Refill the sprayer, measuring the amount of water required to refill to original level.
4. Determine the rate of spray delivery per acre for one nozzle:

<u>Nozzle discharge per 100 square feet</u>	<u>Amount of spray delivered per acre</u>
1/2 pint (1 cup)	27 gallons
1 pint	55 gallons
1-1/2 pints	82 gallons
1 quart	110 gallons

Applying 1 pint/100 square feet is equal to 1 gallon/800 square feet or 3 gallons/2,400 square feet (24 feet x 100 feet).

Method 2:

1. Record the time while spraying 1 square rod (16-1/2 feet x 16-1/2 feet).
2. Catch the discharge from the nozzle in a bucket or other container for same period of time.
3. Measure the spray caught in pints.
4. Multiply the number of pints by 20. This equals the gallons per acre.

Field or Large Sprayer

Method 1:

1. Hang a container under each nozzle.
2. Operate the sprayer at the usual application pressure until about 1 pint of water has been collected in each of the containers.

3. Measure and record the output of each nozzle. Measurements can be made by the dip stick method, in ounces, cubic centimeters, etc.
4. Determine the total output collected from all the nozzles.
5. Determine the average by dividing the total output by the number of nozzles on the boom.
6. Multiply the average by 5 percent.
7. Subtract this figure from the average. This will be the low side of the 10 percent allowed.
8. Add this 5 percent figure to the average. This will be the high side of the 10 percent allowed.
9. The allowed 10 percent spread is between the low figure and the high figure.
10. Compare the output of each nozzle to these low and high figures.
 - a. Take apart and clean all nozzles with an output below the low figure.
 - b. Replace the nozzle with an output greater than the high figure with a new one.
11. After cleaning and replacing the nozzles, repeat steps 1 through 10. Frequently, the output of new nozzles varies greater than the allowed 10 percent.

The sprayer should be rechecked often, even after the original calibration. Be sure the same area is sprayed for each tankful as was planned in the calculation. If more or less area is sprayed than planned, stop spraying and recalibrate. This allows you to catch a small error in calculation or sprayer delivery rate before a major mistake is made. Equipment needs to be recalibrated whenever a different rate of application is used.

Method 2: Sprayer Calibration by the Ounce Method

Equipment needed:

- 100-foot tape
- watch with a second hand
- container graduated in **ounces** (liquid)

1. Select from the table below the appropriate distance based on:
 - a. **Row spacing** is for a single nozzle or a group of nozzles directed at the row.
 - b. **Nozzle spacing** is broadcast spraying over a non-row crop.
 - c. **Band width** is band spraying. Measure off this distance in the field.

Row spacing, nozzle spacing, or band width (inches)	<u>Distance (feet)</u>
40	102
38	107
36	113
34	120
32	127
30	136
28	146
26	157
24	170
22	185
20	204
18	227
16	255
14	291
12	340
10	410
8	508

2. Drive the measured distance at the speed setting you desire to operate the sprayer. Accurately record the time in seconds.
3. Place the container graduated in ounces underneath one nozzle or nozzle group. Operate the spray in place at the selected pressure. Catch the discharge for the same amount of time, in seconds, as was recorded in Step 2.
4. The total discharge from the nozzle or nozzle groups, in ounces, has the same numerical value as the total gallons/acre (broadcast) applied by the sprayer.
5. To determine the number of acres that can be treated with a full sprayer tank, divide the total capacity of the sprayer tank by the gallons/acre value from Step 4.
6. If **band spraying**, modify the gallons/acre (broadcast) from Step 4 and the insecticide rate (broadcast) with the following formulas.

$$\text{Gallons/acre} = \frac{\text{broadcast rate} \times \text{band width}}{\text{row spacing}}$$

$$\text{Amount of insecticide needed per acre} = \frac{\text{broadcast rate} \times \text{band width}}{\text{row spacing}}$$

7. Always recalibrate when the pressure, speed, and/or nozzles are changed.

Applying Dusts and Granular Formulations

Before starting a dusting operation, the application equipment must be checked and calibrated. Even if the regulator on the equipment is at a given setting, the rate of application can change because different dust mixtures have different densities.

1. Read the operator's manual supplied by the manufacturer. Follow the instructions for adjusting equipment to the proper settings for the product and application rate being used.
2. Fill each hopper to an easily determined level or mark.
3. Measure off an area at least $\frac{1}{4}$ acre or 1,000 feet of row. *Example:* Eight 40-inch rows $\frac{1}{4}$ mile long equals 0.808 acres.
4. Dust the measured area. Drive at a constant speed and use a speedometer if possible. The speed affects the application rate. A constant speed is necessary to apply the insecticide evenly and accurately.
5. Refill the hopper to the same level. Carefully weigh the amount of insecticide needed to refill the hopper. Another way to do this is to weigh accurately a given amount of the dust product. Refill the hopper with this dust. Weigh the amount of dust leftover. Subtracting the second weight from the first weight will give the amount of dust needed to refill the hopper.
6. The amount of insecticide dust it takes to refill the hopper is the amount applied to the measured area or distance.
7. Determine the application rate by dividing the amount applied by the area.

Example: Suppose a bag contains 50 pounds of dust product. This was used to refill the hopper. After refilling the hopper, the bag weighed 34 pounds. Sixteen pounds were applied (50 pounds – 34 pounds = 16 pounds). Dividing 16 pounds by 0.808 acres gives 19.8 pounds per acre.

8. If the amount applied does not fall within 5 percent of the recommended dosage, reset the gate openings and repeat the previous three steps.
9. Keep a record of the acreage treated with each filling of the hopper. This will let you see any slight change in rate of application and make the necessary adjustments.