

Name: _____

Sprayer Calibration

Farmers use sprayers to apply fertilizer and pesticides to their fields. It is essential for sprayers to apply the correct amount of product to the field for both economic and environmental reasons. Prior to using applying product to the field, farmers calibrate their sprayers and use mathematics to find the correct volume of mix to be applied. This activity will help you understand the components of calibration. Use the K-State Research and Extension Calibrating a Sprayer with the Ounce Collection Method to help answer the questions in this activity.

1. What are the eight basic properties of sprayer application?
2. Improper application can result in wasted _____, marginal _____, _____ or _____ control, excessive carryover, _____ contamination and crop damage.
3. How often should sprayers be calibrated?
4. Summarize the four steps in determining gallons per acre.
5. Suppose a sprayer was set up with 20-inch nozzle spacing.
 - a. What distance should be marked off to calibrate the sprayer?
 - b. What would the travel speed be if the sprayer was traveling 6.0 mph?
 - c. If you are calibrating with a 7-27-7 fertilizer, what is the density of the solution in pounds per gallon?

Sprayer Calibration

6. Pesticides have sprayer application rates, in gallons per acre, listed on the label. For example, 20 gallons per acre. If a farmer is using a 800-gallon capacity sprayer to apply a pesticide at 20 gallons per acre, how many times would the sprayer need to be refilled to spray 1,200 acres?
7. To apply the correct amount of pesticides, a sprayer must maintain its speed at all times. The amount of pesticide applied is dependent on the set sprayer travel speed. Reduction in speed could result in overapplication.

If a farmer is applying 20 gallons per acre at 6 miles per hour (mph) with nozzles 15 inches apart, how many gallons are applied per minute? Use the equation below.

$$\frac{\text{GPA} \times \text{S} \times \text{W}}{5,940} = \text{GPM}$$

8. Sprayers have nozzles along “arms” called booms. Most sprayers have one nozzle per row. How many nozzles would be on a 120-foot boom with 30 inch rows?
9. What is a possible issue with using high pressure in nozzle discharge? Low pressure?
10. How are strainers and screens used on sprayers?

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1. What are the eight basic properties of sprayer application?
Sprayer design, nozzle type, boom height, boom pressure, agitation, chemical dilution, flow rate, ground speed
2. Improper application can result in wasted **CHEMICAL**, marginal **WEED, INSECT**, or **DISEASE** control, excessive carryover, **GROUNDWATER** contamination and crop damage.
3. How often should sprayers be calibrated?
Every time a different pesticide is applied
4. Summarize the four steps in determining gallons per acre.
Select proper nozzle spacing, drive time and travel distance in seconds, measure field length, bring power unit to proper throttle and sprayer to correct boom pressure, measure discharge in ounces
5. Suppose a sprayer was set up with 20-inch nozzle spacing.
 - a. What distance should be marked off to calibrate the sprayer? **204 feet**
 - b. What would the travel speed be if the sprayer was traveling 6.0 mph? **23.2 mph**
 - c. If you are calibrating with a 7-27-7 fertilizer, what is the density of the solution in pounds per gallon? **11 lb / gal**

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$$1200 \text{ acres} \times 20 \text{ gallons} = 24,000 \text{ gallons} / 800 \text{ gallons} = 30 \text{ refills}$$

7. To apply the correct amount of pesticides, a sprayer must maintain its speed at all times. The amount of pesticide applied is dependent on the set sprayer travel speed. Reduction in speed could result in overapplication.

If a farmer is applying 20 gallons per acre at 6 miles per hour (mph) with nozzles 15 inches apart, how many gallons are applied per minute? Use the equation below.

$$\frac{\text{GPA} \times \text{S} \times \text{W}}{5,940} = \text{GPM} \quad \frac{20 \times 6 \times 15}{5940} = .30 \text{ GPM}$$

8. Sprayers have nozzles along “arms” called booms. Most sprayers have one nozzle per row. How many nozzles would be on a 120-foot boom with 30 inch rows?

$$120 \times 12 = 1440 \text{ inches}$$

$$1440/30 = 48 \text{ nozzles}$$

9. What is a possible issue with using high pressure in nozzle discharge? Low pressure?

High pressures (greater than 45 psi) may exert excessive strain on sprayer components, increase wear on the nozzles, and produce drift-susceptible spray

Low pressures (lower than 10 psi) will not develop a full-width spray pattern for each nozzle, and coverage may not be adequate for contact pesticides

10. How are strainers and screens used on sprayers?

Screen keep sand, gravel, and debris from damaging the pump.