Orchard/Air Blast Sprayer Calibration

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Orchard, or air blast, sprayers are the most common pieces of equipment used to apply foliar insecticides, fungicides, plant growth regulators and foliar nutrients to tree crops. In order to apply these products at the correct rate, one must know the total volume applied per unit area. The correct rate is necessary to obtain the desired results, optimize product expenditures and avoid illegal pesticide residues. It is also necessary to make sure that the volume is adequate to obtain coverage of the foliage. These sprayers use fans to generate air flow to carry the spray into the tree canopy, so it is difficult to use collection methods common for other types of sprayers. Air blast sprayer calibration is the process of determining and adjusting a sprayer's total output and distribution to obtain the needed coverage. For an online calibration calculator, go to http://www.noble.org/tools/osCalibration.html.

Typical application volumes for orchard applications range from 50 to 150 gallons per acre (GPA). Small trees require the least application volume while large trees require the most. In most cases, use the minimum volume that will give adequate coverage. Using the minimum volume increases sprayer efficiency because it reduces tendering time. Read and follow the label directions for additional spray volume guidance.

Application volume is a function of sprayer output and speed. In order to decrease application volume, increase speed, decrease spray tip size or reduce pressure. In order to increase volume, reduce speed, use a larger spray tip or increase pressure. Note that it takes a fourfold increase in spray pressure or a one-half reduction in speed to double output and vice versa. Also note that as speed increases above 4 mph, the momentum of the air flow leaving the sprayer is reduced and coverage of the upper portion of the trees may be significantly reduced. Changing tip size is usually the most efficient method of making significant changes in volume.

In summary, using a properly calibrated orchard, or air blast, sprayer is the only way to ensure proper rates and coverage of foliar-applied crop production materials. The following method is one of many to ensure the orchard, or air blast, sprayer is properly calibrated to apply these products. Regardless of the calibration method used, monitor the actual application volume and adjust your spray mix accordingly. ■

Supplies needed:

- Measuring tape or location with a known distance to drive.
- Bucket with volume markings or flow meter.
- Calculator.

1. Inspect sprayer for worn belts, hoses, etc. Grease fittings and make any needed repairs.
2. Clean sprayer and fill with clean water.
3. Set the sprayer at an operating pressure and fan speed that allows the spray to reach the top of the trees.

   Operating Pressure: _____ PSI
4. Measure out a test run of at least 250 feet.

   Distance:_____ feet
5. Choose an operating speed that can be run consistently and safely through all parts of the orchard or grove. Speeds from 1 to 3 mph are common.

   Gear: _____ .

   Rpm: _____ .
6. At the rpm setting from Step 5, readjust the sprayer operating pressure to the same as in Step 3 to ensure that the spray can reach the top of the trees.
7. On a level spot, fill the sprayer to a marked location on the sprayer tank. The location on the tank should be close to the top where the tank is narrower.
8. Operate the sprayer over the test run using the same pressure as in Step 3 and the Gear and rpm from Step 5.
9. Return to the same level spot as in Step 7, and measure the amount of water to refill the sprayer to the marked location on the sprayer tank.

   Gallons:_____ .
10. Determine the actual spray width in feet.

    Actual Spray Width:_____ feet.
    For single-sided sprayers, width = one-half the row spacing or approximately one-half the diameter of the average-sized tree in a native grove.
    For double-sided sprayers, width = the row spacing.
11. Calculate application volume in gallons per acre with the following formula:

$$\text{GPA} = \frac{\text{Gallons (Step 9)}}{[(\text{Distance (Step 4)} \times \text{Spray Width (Step 10)})/43{,}560]}$$

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12. If the GPA is too high, increase speed, decrease tip size or reduce pressure. If is too low, reduce speed, use a larger tip or increase pressure. After the adjustments, repeat the calibration procedure until the GPA is acceptable.