WASHINGTON STATE UNIVERSITY
CHELAN/DOUGLAS/OKANOGAN COUNTY EXTENSION

Calibrating Orchard Weed Sprayers

Timothy J. Smith
Area Extension Agent

Just after harvest, before leaves fall is the best time of year to apply soil residual herbicides in orchards. All boom sprayers need a calibration check prior to use, even if they were operating correctly the last time you used them. The following procedure is quick and will give you a precise gallon per acre output from your sprayer.

Equipment needed: a wide mouthed container for catching spray, a tall narrow container calibrated in ounces, a tape-measure, a watch or stopwatch, and a calculator.

Step 1:   Clean out tank, filter, lines, and (especially) nozzles and strainers. Use a soft toothbrush on the nozzles and strainers. Make certain all the strainers are the same type and mesh. Ball check strainers reduce nozzle pressure by 5 to 10 psi, or you may have 25, 50 or 100 mesh.   Flush and reassemble the boom.

Step 2:   Partially fill the spray tank with clean water. Run the sprayer for a few minutes, checking the pressure and spray pattern. The pressure must be sufficient to create a good spray pattern, but the least possible small spray particles.   Is the boom at the proper height so that the individual nozzle patterns overlap each other about 1/3 at the height of the target surface? (With soil residuals the target is the soil surface, with contact materials, the target may be foliage 4-6" above the soil surface). Split your overlap you have set up on the end of the boom in half. (Note: Your off-center "OC" nozzle you may have on the outer end of the boom should put out half the rate as the rest of the boom, as you are going to cover this section of the swath twice.) Measure carefully the width of the swath that the sprayer is covering. Record this as feet and tenths of feet. Example: 37 inches divided by 12 = 3.1 feet.

Step 3:   Catch each nozzle output for 1 minute. Are the nozzles applying similar rates per minute? If not, replace the ones that are putting out much more than the should at the pressure, re-clean the ones putting out the least and measure all of them again. The output from each nozzle is determined by nozzle size and pump pressure. At 30 psi, 8002 nozzles should spray about 22 ounces per minute, at 20 psi the output should be 18 oz./minute. The last number on the spray nozzle indicates how many tenths of a gallon per minute it will put out at 40 psi. (40 psi is too high for normal operation, 25 psi is plenty. Some spray tips are designed to operate well at lower pressures.)

Step 4:   Once you have all the nozzles output balanced evenly across the boom, add all of the output per minute together and determine how many gallons per minute the entire boom is spraying. (The boom total output per minute in ounces, divided by 128 equals gallons per minute.)

Example: 3 nozzles at 23 oz/min. = 69 oz. total.   So, 69/128 = 0.54 gallon/minute

Step 5:   Estimate the speed you wish to drive (usually about 2 mph) and fill in this formula:

$$\frac{495 \text{ x gal. sprayed per minute}}{\text{Miles per hour x sprayed width}} = \text{Gallons Per Acre}$$

Example:

$$\frac{495 \text{ x } 0.54 \text{ gallons}}{2.15 \text{ mph x } 3.1 \text{ feet}} = 40 \text{ GPA}$$

Step 6:   Adjust gallons per acre by slight alterations in nozzle pressure or speed of travel. If you adjust nozzle pressure, you'll have to do the entire procedure from Step 4 again. You can adjust your speed to achieve your desired gallons per acre by dividing your calculated GPA by your desired GPA, then multiplying that number by the miles per hour you used in the formula. The result will be the mph you should drive without changing your boom output. Changing engine RPM will usually change the boom psi, so you may need to re-adjust that with the regulator.

Example: We wanted 40 GPA, at 2 MPH, our calculation showed we were getting 45 GPA.

$$\frac{45}{40} = 1.125 \qquad (1.125 \text{ x } 2 \text{ mph} = 2.25 \text{ mph})$$

Step 7.   Check your speed. Time the tractor over an 88 foot distance. Divide the seconds it took into 60 for MPH. OR divide 60 by desired MPH to determine how many seconds it should take to drive 88 feet.

Example: 60 divided by 2.25 mph = 26.6 seconds to drive 88 feet.

This should all be worked out before the morning when you intend to spray. The wind usually starts about 10 a.m., so you don't have much time when spray conditions are perfect.

Following the above procedure will likely improve the performance of your weed control materials and increase the margin of safety to your trees. Once you become familiar with the procedure, it's quick, easy and accurate. It's also vital to safe, effective herbicide application.