

CALIBRATION PROCEDURES

SPRAYER CALIBRATION

Sprayer calibration is the process of determining the correct nozzle size, type, speed and pressure to create a desired droplet size at a given application rate (GPA). To properly calibrate a sprayer, determine the wanted GPA and then use manufacturer's guides to determine the correct nozzle size, type and pressure to obtain the desired droplet size. Herbicides are typically applied with medium to coarse droplets and fungicides and insecticides with medium to fine droplets. Air induction (A.I.) are a good choice for reduced drift. Note that some chemical labels specify which type of nozzles you must use to apply that chemical. Once on the sprayer, a manual check should be made to confirm correct flowrate at a given pressure. This procedure is performed by collecting the output of each nozzle with time using a calibration jug. Any tip deviating more than 10% from the average of all tips should be replaced. More automated measuring systems, such as the SpotOn calibrator, can greatly reduce the time needed to perform this operation. Visual checks should be made in the field for any booms or nozzles misting, as this can be sign of clogged filters or screens. Details on this process are given below:

- 1) Measuring the flow rate of individual nozzle tips: Put the sprayer in manual mode where spray can be produced at a certain pressure without sprayer movement. Measure the flow rate of each tip (GPM) and record. Once all nozzles have been measured, calculate the average GPM for all the nozzles and compare to each individual nozzle. If the GPM falls outside +/- 10% of the average value, the nozzle should be replaced. If the average GPM of all nozzles is above or below the target value, the pressure may need to be adjusted to obtain the correct flowrate and a check of the flowrate sensor may be necessary. Nozzle tests should be performed once a year. Note that in the field, the flow rate sensor may supersede pressure readings to create a desired flowrate (GPA), and misting can occur if boom sections, nozzles or filters are clogged. In this case, disassemble each section and clean. The general equation for calculating nozzle flow is:

$$GPM = \frac{GPA * MPH * W}{5940}$$

GPM is the gallons per minute of liquid used per application width.

GPA is the gallons per acre.

MPH is the average speed of the vehicle through the field.

W is the nozzle application width in inches (typically the distance between the nozzles for broadcast sprayers or banding width for banding sprayers).

- 2) Calibrating sprayer speed: Sprayer speed is essential for a rate controller to determining the correct flowrate in constant orifice type spray system. On newer sprayers, speed is usually determined with a GPS sensor and no calibration is required. On older sprayers, the system may use radar, wheel sensors or a GPS sensor that mimics a radar sensor. In these sprayers, the sprayer may have to be operated over a set travel distance in a calibration mode to determine the correct number of pulses per distance and speed. Check manufacturer's directions for this procedure. Calibration of the speed sensor should be performed at least once a year. If problems persist, check that the radar unit is securely fixed to the vehicle frame and has the correct angle between the unit and the ground (typically 30 to 45 degrees, although some newer units are mounted horizontal). The speed versus travelling distance and time of a sprayer can be checked using the equation given below: Perform over at least 500 feet to ensure 0.5 mph or better accuracy.

$$MPH = \frac{360 * Distance Travelled in Feet}{528 * Time Needed to Travel that Distance in Seconds}$$