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College of Agriculture, Human, and
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Cooperative Extension

BOOM TYPE SPRAYER CALIBRATION

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Sprayer calibration is a crucial step to optimize insect, weed, and disease control in your nursery. Proper calibration will tell you the exact amount of chemical to add to your spray tank. Not only will calibration ensure you are using enough chemical to control the target pest, you will know that you are not wasting money and causing potential harm to the environment by using too much chemical.

THE 5 KEY STEPS FOR BOOM SPRAYER CALIBRATION:

Follow these 5 key steps to calibrate your boom sprayer. For a detailed description of each step, continue on page 2.

1. Measure the nozzle spacing on the boom sprayer.
2. Based on your nozzle spacing measurements, determine a course length. Clearly mark a course length on terrain similar to what will be sprayed.
3. Time how long it takes to drive your tractor, with all the spray equipment fully operating, the length of the marked course.
4. Catch the spray from any one nozzle for the time it took to drive the course.
5. The spray output captured from that one nozzle, in fluid ounces, is equal to the number of gallons per acre your entire boom sprayer is applying. **Do not** add the spray output from each nozzle together. (Example: 50 fl. oz. of spray was caught from one nozzle which correlates to 50 gallons per acre.)

Nozzle Spacing	Course Length	Nozzle Spacing	Course Length	Nozzle Spacing	Course Length
10 in.	408 ft.	20 in.	204 ft.	30 in.	136 ft.
12 in.	340 ft.	22 in.	185 ft.	32 in.	127 ft.
14 in.	291 ft.	24 in.	170 ft.	34 in.	120 ft.
16 in.	255 ft.	26 in.	157 ft.	36 in.	113 ft.
18 in.	227 ft.	28 in.	146 ft.	38 in.	107 ft.

Table 1.
Various nozzle spacing and their corresponding course distance. For nozzle spacing not listed, the course length can be calculated by dividing 340 by the nozzle spacing (in feet) or 4084 by the nozzle spacing (in inches).

BOOM SPRAYER CALIBRATION:

The 1/128th of an acre method

The following 5 steps below include the detailed descriptions for boom sprayer calibration. Before even beginning the calibration process, it is important to inspect the condition of the sprayer and equipment. Make sure all parts are working correctly. Flush the whole system with water if the sprayer has not been used recently. Ensuring that your sprayer is working correctly will save you time and money. Replacing parts that are old and worn out will help prevent a major mechanical overhaul.

Step 1:

Measure the nozzle spacing on the boom sprayer and refer to Table 1.

In Table 1, the relationship between nozzle spacing and the course length always sums to 1/128th of an acre (340 ft^2). For example, if nozzle spacing is 12 inches (1 ft.), then the course length would be 340 ft. Thus, a 340 ft. long course by 1 ft. wide is 340 ft^2, which equals 1/128th of an acre.

The unique benefit of using the 1/128th of an acre calibration method is there are no conversions required. Since there are 128 fl. oz. in one gallon, the fl. oz. of spray caught per nozzle equals gallons per acre.

For nozzle spacing not listed in Table 1, the course length can be calculated by dividing 340 by the nozzle spacing (in feet), or 4084 by the nozzle spacing (in inches). For example, the distance between nozzles on the boom is 15inches (1.25 ft.): 4084/15 = 272 feet, or, 340/1.25 = 272 feet. Thus, the course distance to measure is 272 feet.

Step 2:

After referring to Table 1, clearly mark the course length with a measuring wheel or 300 ft. tape measure on terrain similar to what will be sprayed.

Step 3:

Drive the marked course, twice, recording the times. Then average the two times together.

Before driving the course, choose and record the tractor's RPM, spray pressure, and gearing. These settings will be the same settings used when actually spraying the chemical in the field. Get a running start and drive the course with the sprayer fully operating. As soon as the boom passes over the start line, start the timer. Stop the timer when the boom passes over the finish. Time the course again after readjusting the RPMs. Readjusting the RPMs, and timing the course again will help with calibration accuracy because the operator may need to adjust RPMs between the calibration process and the actual spraying. Averaging the two times helps account for this error.

Step 4:

Catch the spray from one nozzle for the time it took to drive the course.

With the tractor and sprayer idling at the same spray pressure and RPM used to drive the course, catch the spray from one nozzle for the

time it took to drive the course. The number of fluid ounces caught equals the total number of gallons per acre the boom sprayer will spray. Do not add the spray output from each nozzle together.

To ensure all the nozzles are delivering the same volume of spray, capture the spray volume on all the nozzles for the same amount of time. If volumes differ by more than 5%, remove the nozzles and filters, check for clogs, and flush the system with clean water. For help in selecting the correct nozzle tip size, refer to Table 3.

Step 5:
The fluid ounces caught equals the gallons per acre.

Remember to record all the variables involved in your calibration such as nozzle spacing, course length, tractor model, RPMs, gearing, spray pressure, nozzle tip size, and spray output. (Refer to the form at the bottom of the page for recording your information). If spray output needs to be adjusted, refer to Table 2.

To Change Spray Output More Than 10-20 GPA.	To Change Spray Output Less Than 10-20 GPA.
• Increase/decrease nozzle tip sizing	• Increase/decrease ground speed • Increase/decrease spray pressure

Table 2.
Methods to adjust spray output.

Nozzle Tip	Output (GPA)*	Nozzle Tip	Output (GPA)*
8001	6.4	8005	39
8002	13	8006	52
8003	19	8010	64
8004	26	8015	97

Table 3.
Spray output and tip sizing for flat fan spray tips. This table is intended as a rough guide only and should only be used to help select the proper spray tip size. Sprayer calibration is still required to determine actual spray output. *Spray output was obtained using 30 psi and a groundspeed of 4 mph.

THINGS TO REMEMBER WHEN CALIBRATING:

1. Make sure the sprayer and all its parts are working correctly before calibrating. Check the pump, hoses, valves, tank, filters, nozzles, etc.
2. If the sprayer hasn't been used in several months, remove all the spray tips and filters and flush with clean water for several minutes.
3. Use plain water only during the calibration process.
4. Make sure all the spray tips are the same size.
5. Spray pressure should be between 30 and 60 psi when using regular flat fan spray tips.
6. Avoid using even tips (E) on a multiple nozzle boom sprayer.
7. Adjust the height of the boom based on the target and the nozzle spacing. Spraying a tall plant will require a higher boom height than spraying bare ground. Nozzles closer together will require a lower boom height than nozzles farther apart.
8. When finished spraying, always flush the spray system with clean water.
9. Always use your best judgment and follow safety practices and regulations.

ADDING THE CHEMICAL TO THE TANK:

Once you determine spray output in gallons per acre, use the following formula to determine how much chemical to add to the spray tank:

$$\frac{\text{Gallons in tank}}{\text{Gallons per acre}} \times \text{Amount of chemical recommended per acre} = \text{Amount of chemical to add to tank}$$

EXAMPLE 1: The product you want to use recommends 2 pints per acre. The spray tank will be filled with 50 gallons and the spray output calibrated was 25 gallons per acre:

$$\frac{\text{50 gallons in tank}}{\text{25 gallons per acre}} \times \text{2 pints of chemical per acre} = \text{4 pints of chemical to add to tank}$$

EXAMPLE 2: The product you want to use recommends 3 quarts of chemical per acre. The spray will be filled with 400 gallons and the spray output calibrated was 75 gallons per acre:

$$\frac{\text{400 gallons in tank}}{\text{75 gallons per acre}} \times \text{3 quarts of chemical per acre} = \text{16 quarts of chemical to add to tank}$$

EXAMPLE 3: The product you want to use recommends 2.5 ounces of chemical product per acre. The spray tank will be filled with 100 gallons and the spray output calibrated was 30 gallons per acre:

$$\frac{\text{100 gallons in tank}}{\text{30 gallons per acre}} \times \text{2.5 ounces of chemical per acre} = \text{8.3 ounces of chemical to add to tank}$$

EXAMPLE 4: The product you want to use recommends 0.5 pounds active ingredient per acre. The pesticide label states there is 4 pounds active ingredient in one gallon of product. The spray tank will be filled with 100 gallons and the spray output calibrated was 50 gallons per acre:

$$\frac{\text{0.5 pounds ai/acre}}{\text{4 pounds ai/gallon}} = \text{0.125 gallons of chemical/acre}$$

Then:

$$\frac{\text{100 gallons in tank}}{\text{50 gallons per acre}} \times \text{0.125 gallons of chemical per acre} = \text{0.25 gallons (32 fl. oz.) of chemical to add to tank}$$

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SPRAYER CALIBRATION FORM

This form is intended to be used with the "Boom Type Sprayer Calibration" publication. The measurements and information recorded on this form should be safely filed for later reference if needed.

Date:_____

Nursery:_____Operator:_____

Tractor:_____Gear:_____RPM:_____

Nozzle(s) Size:_____ Nozzle Spacing:_____ Pressure (PSI):_____

Course Length:_____ Time 1:_____Time 2:_____Average Time:_____

Tank Volume:_____ Chemical:_____ Chemical per Acre (from label):_____

Spray output:_____ in gallons per acre (read in fluid ounces)

To calculate the amount of chemical needed per tank, use the following formula:

Gallons in tank / Spray output (GPA)	X	Amount of chemical per acre	=	Amount of chemical to add to tank
_____	X		=	

To calculate the total amount of chemical needed, use the following formula:

Tank Volume / Spray output calibrated (GPA)	=	Number of acres tank volume will cover
_____	=	

Then:

Number of acres to be sprayed / Number of acres tank volume will cover	=	Amount of chemical needed for the acres
_____	=	