Example 2

Banded herbicide application in 12-inch band over corn rows spaced 36 inches apart. Field size is 30 acres and labeled (broadcast) rate is 2 pints per acre. The band is applied with one nozzle per row.

Step 1. Based on a band width of 12 inches, you need to drive 340 feet.

Step 2. You determine that it takes 58 seconds to drive 340 feet.

Step 3. Output per nozzle for 58 seconds is 24 ounces. This means your sprayer is applying 24 gallons per treated acre. Note: When you apply pesticides in a band, you are treating only a fraction of the total area of the field. This area is referred to as treated acres. To determine how many treated acres there are in a specified field acreage, multiply the field acreage by the ratio of the band width to the row width:

Treated acres = field acres X (band width divided by row width).
In this example, 30 acres X (12-inch bands divided by 36-inch rows) = 10 treated acres.

Step 4. To figure out how much herbicide is needed to treat the field:

Multiply the number of treated acres by the gallons per treated acre to determine the amount of total spray solution needed to treat the entire field:

10 treated acres x 24 gallons per treated acre = 240 gallons spray solution.

Determine the amount of herbicide needed to treat the 30-acre field by multiplying the number of treated acres by the labeled broadcast rate:
10 treated acres x 2 pints per acre = 20 pints or 2.5 gallons

Add 2.5 gallons of herbicide to 237.5 gallons of water (240-2.5) to treat the 30-acre field in 12-inch bands.

Example 3

Directed fungicide application using 3 nozzles per row to a crop planted in 40-inch rows. The field size is 30 acres and the labeled (broadcast) rate is 2.5 quarts per acre.

Step 1. Based on a row spacing of 40 inches, you need to drive 102 feet.

Step 2. You determine that it takes 17 seconds to drive 102 feet.

Step 3. Output per group of 3 nozzles directed to the row for 17 seconds is 18 ounces. This means your sprayer is applying 18 gallons per acre.

Step 4. To calculate how much fungicide is needed to treat the field:

Multiply field acres by the gallons-per-acre output to determine the amount of total spray solution needed to treat the field:
30 acres x 18 gallons per acre = 540 gallons spray solution.

The amount of fungicide needed to treat the field is:
30 acres x 2.5 quarts per acre = 75 quarts or 18.75 gallons.

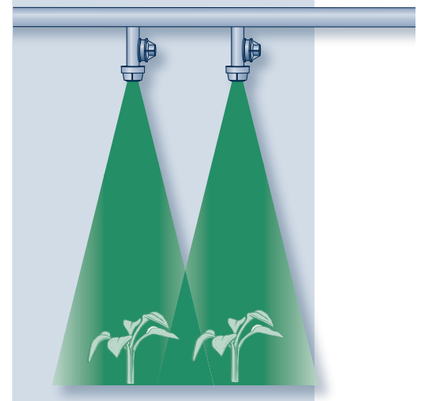
Add 18.75 gallons of fungicide to 521.25 gallons of water (540-18.75) to treat the 30-acre field.

Caring for Your Environment

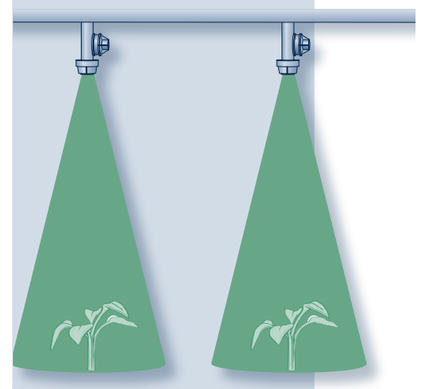
CALIBRATING A BOOM SPRAYER

CropLife Foundation

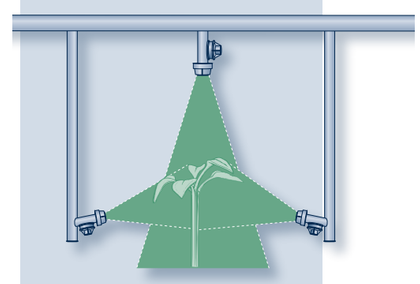
Tips on Working Safely with Pesticides in North Carolina



BROADCAST



BAND



DIRECTED

Calibration is the process of measuring and adjusting your sprayer's output. A properly calibrated sprayer avoids waste of farm chemicals, crop injury and potential harm to the environment. You need to calibrate spray equipment at the beginning of the growing season, several times throughout the year, and at least every other day when in continuous use.

Before you calibrate, be sure the sprayer is in proper condition for field use.

1) Remove nozzles, screens, and in-line strainers and clean them in soapy water with a soft brush. (Using a knife or metallic object to clean nozzles will ruin them.)
2) In a place away from any wells or water supplies, rinse the spray tank thoroughly and partially fill it with clean water.
3) Start the sprayer and flush hoses and boom with plenty of water.
4) Turn the sprayer off and put nozzles back on the boom. All nozzles should be the same size and type.
5) Refer to the nozzle manufacturer's catalog to find out what boom height will give you the spray pattern overlap or band width that you need.
6) Restart the sprayer, adjust pressure for proper field application, and inspect nozzles for proper spray pattern. Replace any nozzle that produces an irregular spray pattern. Recheck for even pattern.

Check nozzles for uniform output

1) Find a container marked in ounces. With the sprayer operating at the desired pressure, catch the output from each nozzle for 30 seconds. Write down the output from each nozzle.
2) Add the amounts caught from each nozzle and divide by the number of nozzles to get the average output per nozzle
3) If the output from any nozzle is more than 10 percent above or below the average, clean or replace that nozzle.
4) If any nozzles required adjustment in step 3, repeat steps 1, 2, and 3 to be sure the flow rate is uniform.

Three types of applications are common with a boom sprayer:

Broadcast—Pesticide applied with overlapping nozzle patterns to ensure uniform coverage for the entire length of the boom.

Band—Pesticide applied in strips or rows in the field.

Directed—Foliar application of a pesticide to cover the entire plant or a specific portion of it.

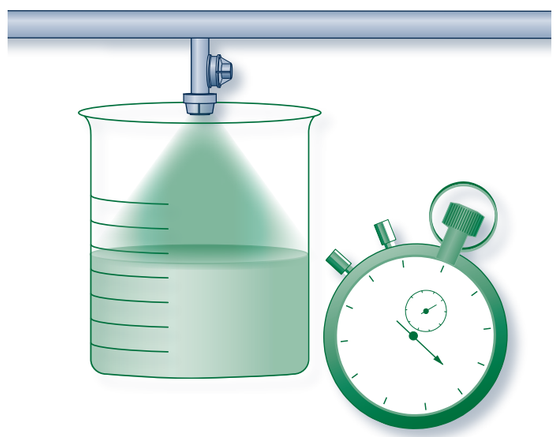
CropLife Foundation
North Carolina Environmental Stewardship Project of CropLife Foundation
1156 15th Street, NW, Suite 400, Washington, DC 20005, 202.296-1585

Calibration Travel Distance

Nozzle Spacing, Band, or Row Width (inches)	Distance (feet)
6	681
8	510
10	408
12	340
14	292
16	255
18	227
20	204
22	186
24	170
26	157
28	146
30	136
32	128
34	120
36	113
38	107
40	102
42	97
44	93
46	89
48	85

Follow these easy steps to calibrate a sprayer.

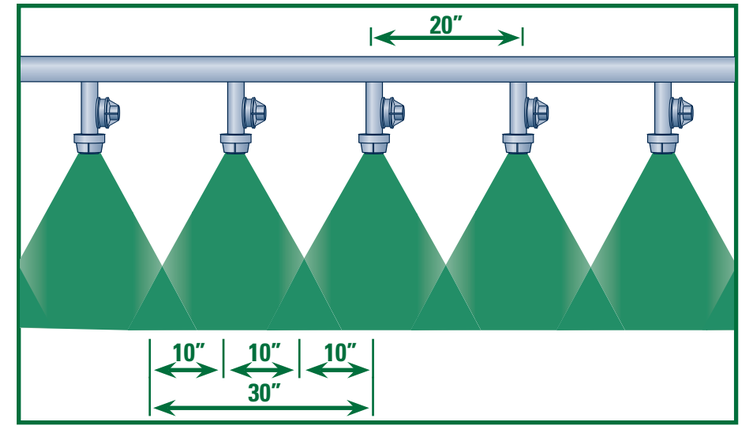
1) Fill your sprayer tank half full with water (no pesticide).
2) From the table (left), determine the distance that the sprayer must travel for each nozzle to spray 1/128th of an acre. Use nozzle spacing (distance between nozzles on your spray boom) to determine driving distance for broadcast sprays. Use band width to determine driving distance for banded sprays. Use row width for foliar sprays directed to the crop.
3) Measure the course distance in the field and flag it for easy visibility.
4) Drive the test course at the desired spraying speed without spraying. The important step here is to record the seconds it takes to drive the measured distance. Be sure to take a "running start" at the starting flag so your tractor/sprayer reaches the desired speed before you begin timing.
5) Park your tractor/sprayer, set your brakes, but keep the engine rpm at the same setting used to drive the test course.
6) Catch spray in a container marked in ounces for the time noted in step 4. Catch spray from one nozzle for broadcast sprayers. Catch spray from all nozzles per row for banded or row crop directed sprays.



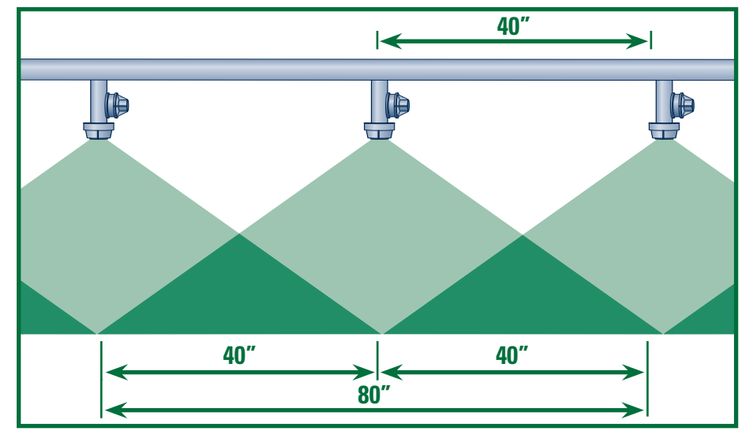
7) The amount of water collected in ounces per nozzle (for broadcast) or group of nozzles (multiple nozzles per band or row) equals gallons per acre applied.
8) If necessary, make adjustments to obtain desired output. Change pressure for small adjustments. Change speed (and re-calibrate) or nozzle tips for large adjustments.

Technical Reviewer: Wayne Buhler, Ph.D., College of Agriculture and Life Sciences, NC State University

When broadcasting, refer to the nozzle supplier's catalog to determine the appropriate nozzle spacing, position, and height that will result in the spray pattern uniformity that you need.



To spray uniformly, adjust flat fan nozzles so that 30 to 50 percent of the spray pattern overlaps.



To spray uniformly, adjust cone nozzles so that 100 percent of the coverage overlaps (double coverage).

Example 1

Broadcast herbicide application on a 30 acre field at a rate of 2 pints per acre.
Nozzle spacing is 22 inches.

Step 1. Based on a 22-inch nozzle spacing, you need to drive 186 feet.

Step 2. You determine that it takes 32 seconds to drive 186 feet.

Step 3. Output per nozzle for 32 seconds is 13 ounces.
This means your sprayer is applying 13 gallons per acre.

Step 4. To figure out how much herbicide is needed to treat the field:

Multiply the number of acres (30) by the gallons-per-acre output (13) to determine the amount of total spray solution needed to treat the field:

30 acres x 13 gallons per acre = 390 gallons spray solution.

The amount of herbicide needed to treat the field is:
30 acres x 2 pints per acre = 60 pints or 7.5 gallons.

Add 7.5 gallons of herbicide to 382.5 gallons of water (390-7.5) to treat the 30-acre field.