

## Sprayer Calibration

Calibration is determining the **amount of spray applied** to a unit of area, usually in gallons per acre. It is determined by 1) nozzle opening or orifice size, 2) pressure, 3) ground speed and 4) nozzle spacing.

Proper calibration is necessary for efficient use of expensive agricultural chemicals and for protection of the environment. Always calibrate pesticide spray equipment using clean water. Never calibrate after pesticides have been mixed. Always calibrate under the same conditions you will face when actually spraying. Check that equipment, pumps and hoses are in proper working order, and check for uniformity of nozzles output along the boom and correct nozzle pattern.

A simple calibration technique is the *1/128th of an acre method* - there are 128 ounces per gallon. Volume in **ounces** sprayed from a nozzle over an area of 1/128 acre equals the application rate in **gallons per acre**.

These steps let you calibrate for broadcast application:

1. Measure and mark a course 1/128th of an acre. For a broadcast boom with nozzles spaced on 20" centers, the table below shows a course length of 204'. Place marks at the start and finish, 204' apart. The course should be the same conditions as the field to be sprayed.
2. Drive through the course at the same speed and gears you will drive when spraying. Time it twice – down and back – and use the average of the two.
3. Record the time it takes to drive the measured course.
4. Park the tractor and operate the sprayer at the same pressure and RPMs as will be used in the field. Turn on the sprayer, and let the air bleed until flow is constant. Choose the nozzle that delivers an amount closest to the average amount determined during the nozzle uniformity check. Collect the flow from one nozzle for the time you recorded.
5. Flow collected in **ounces** equals the **gallons per acre** for a broadcast application.

Refer to the UF/IFAS **edis** document <http://edis.ifas.ufl.edu/pdffiles/AE/AE0120> for a fuller explanation, and adjusted calculations for band application. Other guides for pesticide equipment and application are found at the **edis** publication collection.

Row or Nozzle Spacing	Length in feet to equal				Feet to equal 1/100 A		
	1 acre	1/100 acre	1/128 acre	1/1000 acre	2 rows	4 rows	6 rows
10"	52,272	523	408	52.3	261	131	87
12"	43,560	436	340	43.6	218	109	73
15"	34,848	348	272	34.8	174	87	58
18"	29,040	290	227	29.0	145	73	48
20"	26,136	261	204	26.1	131	65	44
24"	21,780	218	170	21.8	109	54	36
28"	18,669	187	146	18.7	93	47	31
30"	17,424	174	136	17.4	87	44	29
32"	16,335	163	128	16.3	82	41	27
36"	14,520	145	113	14.5	73	36	24
40"	13,068	131	102	13.1	65	33	22
48"	10,890	109	85	10.9	54	27	18
60"	8,712	87	68	8.7	44	22	15
72"	7,260	73	57	7.3	36	18	12

When nozzles, pressure, speed or application conditions change, recalibrate.

**Be a Good Neighbor** – discuss your plans to apply pesticides with your neighbors to make certain their property and health are not jeopardized by your application.

## Calibration and Sprayer Nozzle Considerations

Output of a nozzle tip depends upon the size and shape of the tip opening (the orifice) and the pressure of the fluid forced through it. Application rate - gallons per acre - depends upon the output, the speed at which the tip moves across the field, and the width of the strip covered by the tip's spray pattern.

Tank Capacity	Application Rate – Gallons per Acre (gpa)						
	5	10	15	20	25	30	40
25 gallons	5	3.5	1.7	1.2	1	0.8	0.6
50 gallons	10	5	3.3	2.5	2	1.7	1.3
100 gallons	20	10	7.5	5	4	3.3	2.5
200 gallons	40	20	13.3	10	8	6.7	5
250 gallons	50	25	16.7	12.5	10	8.3	6.2
350 gallons	70	35	23.3	17.5	14	11.7	8.8
500 gallons	100	50	33.3	25	20	16.7	12.5

### Recommendations for sprayer nozzle tips:

- Solvents (gas, oil, diesel, grease) soften plastic tips; handling may damage them.
- Use a different rated flow tip to make large changes in field application rate.
- Use nozzle strainers and tank/line filters to minimize tip clogging.
- Maintain 25% pattern overlap on flat fans for broadcast applications.
- Reduce drift: use wider angle tips closer to the ground, use lower application pressure, and by use drift-reduction tips.

### Acres Sprayed per Tankful

Nozzle Pattern	Typical spacing	Typical Nozzle pressure	Most Common Application
Flat Fan	20 in	30 – 60 psi	broadcast: herbicides, insecticides, fungicides, fertilizers
Ext Range Flat Fan	20 in	15 – 60 psi	broadcast: herbicides, insecticides, fungicides, fertilizers
Even Fan	Varies	20 – 40 psi	band: herbicides, insecticides, fungicides, fertilizers
Flood	40 in	10 – 25 psi	broadcast: fertilizers, defoliants
Solid Cone	40 in	15 – 40 psi	soil incorporation of herbicides
Disc-Core Cone	Varies	40 – 400 psi	high pressure application: fungicides to tree fruit & vegetables; application of insecticides at 150 psi or lower

### Before You Calibrate

- Make certain your equipment is clean; rinse water goes in the tank.
- Check hoses, pumps, PTO fittings, strainers, filters for soundness and good repair.
- Set the regulator pressure for the job to be done and for drift control.
- Select nozzles for the job and to control spray volume and drift.
- Clean screens, nozzles and strainer with a soft-bristle brush, don't use your mouth!

### When You Calibrate

- Use clean water; **never** calibrate with pesticide mix in the tank!
- Use appropriate Personal Protection Equipment, especially hands and eyes.
- Check for nozzle flow pattern; replace if there is a bad pattern.
- Check for nozzle flow uniformity; replace if there is more than a 10% variation.
- Calibrate under the same field conditions as you will be operating during spraying.

### While You Apply

- Monitor flow to make certain your calibration was accurate.
- Make adjustments in ground speed to "fine tune" the application rate:
  - *faster for lower application rate - slower for greater application.*
- Whenever conditions change, recalibrate.