4-28-2021

2021 Pesticide Safety April 28: Sprayer Calibration

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Extension

2021 Cranberry Pesticide Safety Meeting

UMass Cranberry Station

Research & Extension

Sprayer Calibration

Method of Calibration Depends on Type of Sprayer

Boom Sprayer

Two Methods of Calibration

- 1/128 Method
  - Horizontal Boom
- One Minute Method
  - Horizontal Boom
  - Vertical Boom

Air Blast Sprayer

One Method of Calibration

- One Minute Method

Air Shear Sprayer

One Method of Calibration

Owners Manual

NH Extension

A Quick and Easy Method To Accurately Calibrate A Boom Sprayer (1/128 Method)

Extension

UNH CE - Hillsborough County
329 Mast Road, Room 101
Goffstown, NH 03045
Phone (603)641-6060 Fax (603)645-5252

Boom Sprayer Calibration Worksheet – 1/128 Method

Retain the following information for your records: Date _____

Farm _____ Operator _____ Phone _____

Address _____ Town _____ State _____ Zip code _____

Sprayer and Tractor Identification Sprayer _____ Tractor _____

Calibration

1. Measure the distance between nozzles in inches.

   Distance between nozzles _____ Travel Distance _____

2. Drive the tractor the correct distance shown above and note the exact time in seconds it takes to pass the end points. Make a return pass and check the time again. If the time differs by no more than 2 seconds, average the two times. Repeat if the time differs by 3 seconds or more. Note the engine RPM and gear that were used to make the passes.

   Tractor RPM _____ Gear _____

   Time in seconds – down _____ time in seconds – back _____ Average Time in seconds _____

   Miles per Hour = Distance in Feet x 60 / Time in Seconds x 88 = (Feet) x 60 / (Seconds) X88 = _____ = _____ MPH

3. With the tractor in a stationary position set the same engine RPM used in Step 2. Also set the application pressure (30-40 psi) that you normally use and spray water through the broom. Collect spray at the nozzles when all the nozzles appear to have a uniform delivery at the desired psi. The container(s) should be quickly placed under the nozzle(s) for the exact number of seconds noted in #2 above.

   Pressure _____ PSI

   Number of Nozzles on Boom _____

   Type of Nozzle _____

   Size of Tip _____

   Height of Boom from Target _____

   New Nozzle Tip's Output _____

Nozzle Output			Nozzle Output		
Nozzle #	Tip Size	Output in Fluid Ounces	Nozzle #	Tip Size	Output in Fluid Ounces
1			11		
2			12		
3			13		
4			14		
5			15		
6			16		
7			17		
8			18		
9			19		
10			20		
	Output			Output	
				Total Output	

(Looking at the sprayer from behind, #1 nozzle is on left side)

Average output = Total Output in fluid ounce / Total number of nozzles = _____ fluid ounce / nozzles = _____ fluid ounce = Average Output

Minimum Output = 0.95 X _____ Average Output = _____ Fluid ounces

Maximum Output = 1.05 X _____ Average Output = _____ Fluid ounces

Replace nozzles if output is greater than 10% variation between nozzles

Replace all nozzles if average output is 15% more than a new nozzle's output (from manufacturer's chart or discharge test).

The ounces collected per nozzle for the exact number of seconds equal the rate of spray per acre in gallons.
_____ GPA

(Example: If 18 ounces are collected in the time noted in #2 above, you are spraying 18 gallons per acre from that nozzle).

George Hamilton, Extension Field Specialist

revised January 2019

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Calibrate A Boom Sprayer (One Minute Method)

Extension

Calibrate A Boom Sprayer (One Minute Method)

Extension

Boom Sprayer Calibration Worksheet
One Minute Method

Retain the following information for your records: Date _____

Farm _____ Operator _____ Phone _____

Address _____ Town _____ State _____ Zip code _____

Sprayer and Tractor Identification Sprayer _____ Tractor _____

Calibration

1. Measure the distance between nozzles in inches.

   Distance between nozzles _____

2. Drive the tractor the correct distance shown above and note the exact time in seconds it takes to pass the end points. Make a return pass and check the time again. If the time differs by no more than 2 seconds, average the two times. Repeat if the time differs by 1-3 seconds or more. Note the engine RPM and gear that were used to make the passes.

   Tractor RPM _____ Gear _____ Travel Distance _____

   Time in seconds – down _____ time in seconds – back _____ Average Time in seconds _____

   Miles per Hour = Distance in Feet x 60 / Time in Seconds x 88 = (_____ Feet) x 60 / (_____ Seconds) x 88 = _____ = _____ MPH

3. With the tractor in a stationary position set the same engine RPM used in Step 2. Also set the application pressure that you normally use and spray water through the broom. Collect spray at the nozzles when all the nozzles appear to have a uniform delivery at the desired psi. The container(s) should be quickly placed under the nozzle(s) for the 60 seconds.

   Pressure _____ PSI

   Number of Nozzles on Boom _____

   Type of Nozzle _____

   Size of Tip _____

   Height of Boom from Target _____

   New Nozzle Tip's Output _____

Nozzle Output			Nozzle Output		
Nozzle #		Output in Fluid Gallons	Nozzle #		Output in Fluid Gallons
1			11		
2			12		
3			13		
4			14		
5			15		
6			16		
7			17		
8			18		
9			19		
10			20		
	Output			Output	
				Total Output	

(Looking at the sprayer from behind, #1 nozzle is on left side)

Average output = Total Output in gallons / Total number of nozzles = _____ gallons / _____ nozzles = _____ gallons (Average Output)

Minimum Output = 0.95 X _____ Average Output = _____ Gallons

Maximum Output = 1.05 X _____ Average Output = _____ Gallons

Replace nozzles if output is greater than 10% variation between nozzles.

Replace all nozzles if average output is 15% more than a new nozzle's output (from manufacturer's chart or discharge test).

All Nozzles Output = (_____) GPM

Page Two Boom Sprayer Calibration Worksheet – One Minute Method

Crop: _____

Block (#_____) Spray Swath Width _____ ft

Linear Feet of Row per Acre = 43,560 / Row Width = 43,560 / ( ) = (_____) Feet per Acre
Or Spray Swath Width

Speed in Feet per Minute = MPH X 88 = (_____) MPH X 88 = (_____) Feet per Minute

Block (#_____) Minutes/Acre = Linear Feet Row per Acre / Feet per Minute = (_____) / ( ) = (_____) Minutes/Acre

Arrangement Nozzles (#_____) GPA = GPM X MPA = (_____) GPM X (_____) MPA = (_____) GPA

George Hamilton, Extension Field Specialist *January 2019*

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So, the Dealer Calibrated Your Sprayer?

- How do they (the dealership) determine your speed?
- Did they ask about spray coverage distance?
- About the pressure you need to operate at?
- Are the nozzles for what?

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Why Sprayer Calibration?

- The effectiveness of any pesticide depends upon the proper application and placement of the chemical.

- The purpose of calibration is to ensure that your chemical application machinery is uniformly applying the correct amount of material over a given area.

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Sprayer Calibration

Three Step Process

1. Pre-Sprayer Calibration Check
2. Calibration (Output)
3. Spray Coverage – Spray Deposition

Step 1 - Pre-Calibration Instructions for Sprayers

Prior to calibrating an Air Blast sprayer, please complete the following tasks:

1. Triple rinse the tank and piping. Take special care to flush manifolds and nozzles.
2. Use caution with pressure wash sprayers. This may force water into sealed parts like bearings. You can use push brooms and hoses to scrub them off. Pay special attention to cleaning both sides of nozzles, around the pump and filters.
3. Clean nozzles and record orifice and whirl disc sizes. Do not use any metal object when cleaning sprayer tips.
4. Check the main pressure gauge is working properly and is accurate.
5. Ensure all hoses and fittings are sound
6. Flush out line to pressure gauge.

Step 1 - Pre-Calibration Instructions for Sprayers

7. Clean filters, including tank filters, suction filters, final filters and every screen behind nozzles.
8. Make sure all valves, diaphragms, and O-rings are in good condition and working properly.
9. Check that the agitation system is functioning properly.
10. Check tire pressures on both sprayer and tractor.
11. Make sure the tachometer is working on the tractor.
12. Fill sprayer halfway with clean water.
13. Have operators or mechanics who work with the sprayer/tractor combination present for calibration.
14. Have sprayer operator's manual on hand.

Where to Calibrate

- Calibrate sprayers in the bog that is representative of the area to be sprayed.

- Calibrating a sprayer on a hard surface (such as pavement) can induce errors 5% to a high of 15% compared to calibrating in in a field area.

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Step 2 - Sprayer Calibration – three variables

1. Speed

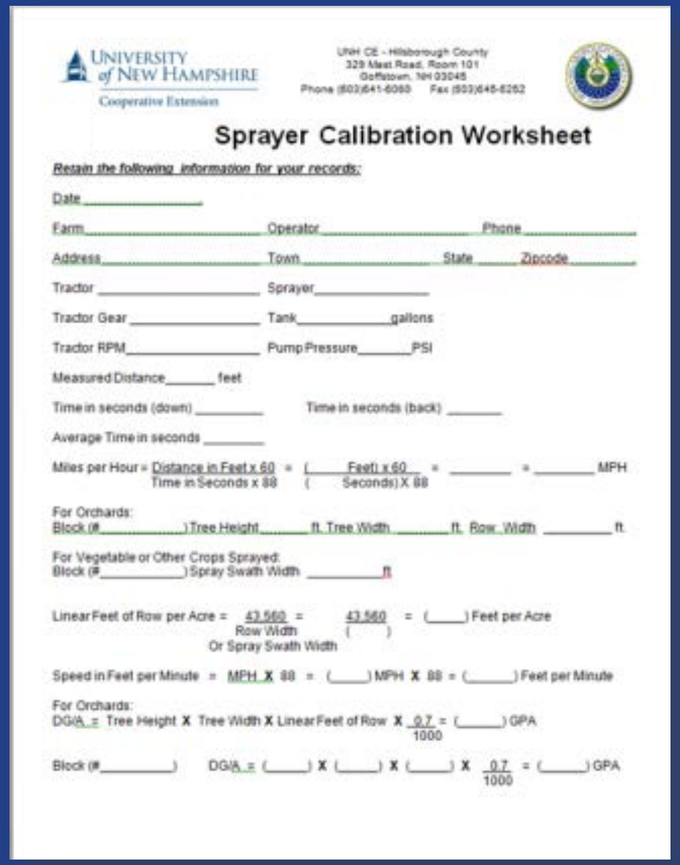
2. Pressure

3. Nozzle – Type and Size

   Forgotten – distance between and distance from nozzle tip to target

Step 2 - Sprayer Calibration

Have a written copy of your sprayer's calibration



UNIVERSITY of NEW HAMPSHIRE
Cooperative Extension

UNH CE - Hillsborough County
329 West Road, Room 101
Goffstown, NH 03045
Phone (603)641-6060 Fax (603)645-6252

Sprayer Calibration Worksheet

Retain the following information for your records:

Date _____

Farm_____ Operator_____ Phone _____

Address_____ Town_____ State _____ Zipcode_____

Tractor _____ Sprayer_____

Tractor Gear _____ Tank_____gallons

Tractor RPM_____ Pump Pressure_____PSI

Measured Distance_____ feet

Time in seconds (down) _____ Time in seconds (back) _____

Average Time in seconds _____

Miles per Hour = Distance in Feet x 60 / Time in Seconds x 88 = (Feet) x 60 / (Seconds) X 88 = _____ = _____ MPH

For Orchards:
Block (#_____) Tree Height_____ ft. Tree Width _____ ft. Row Width _____ ft.

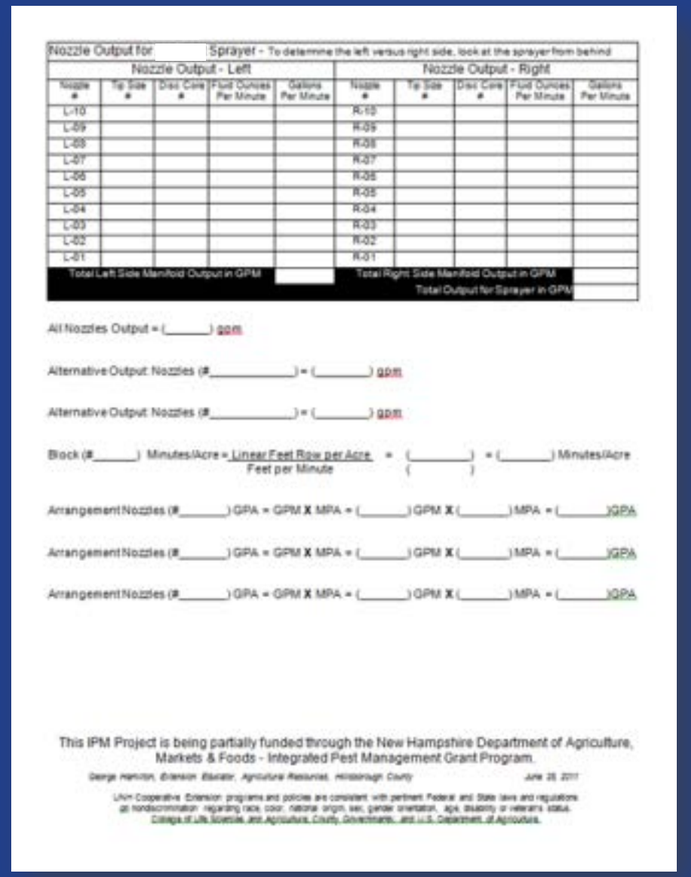
For Vegetable or Other Crops Sprayed:
Block (#_____) Spray Swath Width _____ ft

Linear Feet of Row per Acre = 43,560 / Row Width = 43,560 / ( ) Or Spray Swath Width = (_____) Feet per Acre

Speed in Feet per Minute = MPH X 88 = (_____) MPH X 88 = (_____) Feet per Minute

For Orchards:
DG/A = Tree Height X Tree Width X Linear Feet of Row X 0.7 / 1000 = (_____) GPA

Block (#_____) DG/A = (_____) X (_____) X (_____) X 0.7 / 1000 = (_____) GPA



Nozzle Output for _____ Sprayer - To determine the left versus right side, look at the sprayer from behind

Nozzle Output - Left					Nozzle Output - Right				
Nozzle #	Tip Size #	Disc Core #	Fluid Ounces Per Minute	Gallons Per Minute	Nozzle #	Tip Size #	Disc Core #	Fluid Ounces Per Minute	Gallons Per Minute
L-10					R-10				
L-09					R-09				
L-08					R-08				
L-07					R-07				
L-06					R-06				
L-05					R-05				
L-04					R-04				
L-03					R-03				
L-02					R-02				
L-01					R-01				
Total Left Side Manifold Output in GPM					Total Right Side Manifold Output in GPM				
					Total Output for Sprayer in GPM				

All Nozzles Output = (_____) gpm

Alternative Output Nozzles (#_____) = (_____) gpm

Alternative Output Nozzles (#_____) = (_____) gpm

Block (#_____) Minutes/Acre = Linear Feet Row per Acre / Feet per Minute = ( ) / ( ) = (_____) Minutes/Acre

Arrangement Nozzles (#_____) GPA = GPM X MPA = (_____) GPM X (_____) MPA = (_____) GPA

Arrangement Nozzles (#_____) GPA = GPM X MPA = (_____) GPM X (_____) MPA = (_____) GPA

Arrangement Nozzles (#_____) GPA = GPM X MPA = (_____) GPM X (_____) MPA = (_____) GPA

This IPM Project is being partially funded through the New Hampshire Department of Agriculture, Markets & Foods - Integrated Pest Management Grant Program.

George Hamilton, Extension Educator, Agricultural Resources, Hillsborough County June 28, 2011

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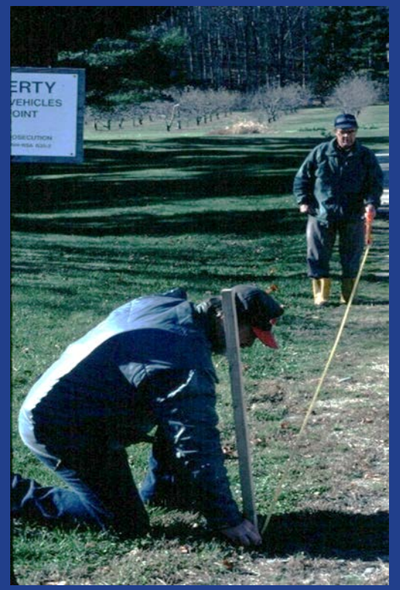
Speed Determination!

Measured Distance_____ feet

Time in seconds (down) _____ Time in seconds (back) _____

Average Time in seconds _____

Miles per Hour = $\frac{\text{Distance in Feet x 60}}{\text{Time in Seconds x 88}}$ = $\frac{(\quad\text{Feet) x 60}}{(\quad\text{Seconds) X 88}}$ = _____ = _____ MPH



Measure and Mark Off the Distance to Determine Speed

Set Engine RPM to the Recommended Speed and the Tractor is in the Proper Gear and Range

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Time tractor-sprayer over given distance – minimum of two times (three is better).

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Nozzle Tip Information!

Nozzle Output for Air-Blast Sprayer - To determine the left versus right side, look at the sprayer from behind									
Nozzle Output - Left					Nozzle Output - Right				
Nozzle #	Tip Size #	Disc Core #	Fluid Ounces Per Minute	Gallons Per Minute	Nozzle #	Tip Size #	Disc Core #	Fluid Ounces Per Minute	Gallons Per Minute
L-10					R-10				
L-09					R-09				
L-08					R-08				
L-07					R-07				
L-06					R-06				
L-05					R-05				
L-04					R-04				
L-03					R-03				
L-02					R-02				
L-01					R-01				
Total Left Side Manifold Output in GPM					Total Right Side Manifold Output in GPM				
					Total Output for Sprayer in GPM				

Nozzle Tip Information!

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Check Nozzle Tips and Hose Connections

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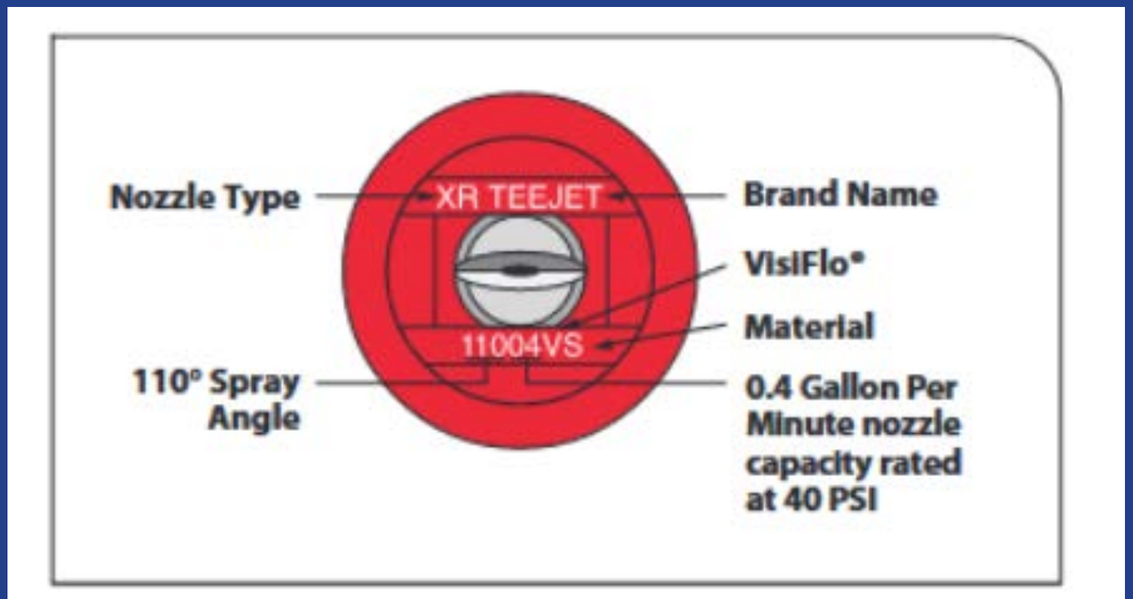
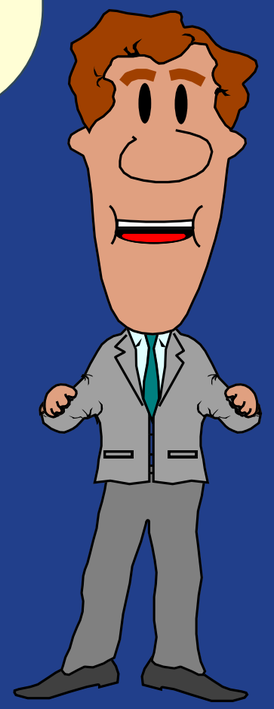
Nozzle Nomenclature

There are many types of nozzles available, with each providing different flow rates, spray angles, droplet sizes and patterns. Some of these spray tip characteristics are indicated by the tip number. Remember, when replacing tips, be sure to purchase the same tip number, thereby ensuring your sprayer remains properly calibrated.



Manufacturer tech sheets are crucial.

Application rate depends on ground speed and pressure



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Manufacturer’s tech sheets

XR TeeJet® Extended Range Flat Spray Tips

Typical Applications:

See selection guide on page 4 for recommended typical applications for XR TeeJet tips.

Features:

- Excellent spray distribution over a wide range of pressures—15–60 PSI (1–4 bar).
- Ideal for rigs equipped with sprayer controllers.
- Reduces drift at lower pressures, better coverage at higher pressures.
- Available in stainless steel, ceramic and polymer in 80° and 110° spray angles with VisiFlo® color-coding.
- Ceramic is available with corrosive-resistant polypropylene VisiFlo color-coded tip holder in 80° capacities 03–08 and 110° capacities 02–08.
- XR110025 only available in VK.
- XR80025 and XR80035 only available in VS.
- Brass available in 110° only.
- Automatic spray alignment with 25612-*-NYR Quick TeeJet® cap and gasket. Reference page 64 for more information.
- Automatic spray alignment for sizes 10 and 15 with 25610-*-NYR Quick TeeJet cap and gasket. Reference page 64 for more information.

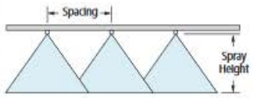
At 15 PSI (1 bar) Pressure — At 60 PSI (4 bar) Pressure

	PSI	DROP SIZE 80°	DROP SIZE 110°	CAPACITY ONE NOZZLE IN GPM	CAPACITY ONE NOZZLE IN OZ./MIN.	20° GPA 4 MPH	5 MPH	6 MPH	8 MPH	10 MPH	12 MPH	15 MPH	20 MPH	GALLONS PER 1000 SQ. FT. 2 MPH	3 MPH	4 MPH	5 MPH
XR8001 XR11001 (100)	15	F	F	0.061	7.8	4.5	3.6	3.0	2.3	1.8	1.5	1.2	0.91	0.21	0.14	0.10	0.08
	20	F	F	0.071	9.1	5.3	4.2	3.5	2.6	2.1	1.8	1.4	1.1	0.24	0.16	0.12	0.10
	30	F	F	0.087	11	6.5	5.2	4.3	3.2	2.6	2.2	1.7	1.3	0.30	0.20	0.15	0.12
	40	F	F	0.10	13	7.4	5.9	5.0	3.7	3.0	2.5	2.0	1.5	0.34	0.23	0.17	0.14
	50	F	F	0.11	14	8.2	6.5	5.4	4.1	3.3	2.7	2.2	1.6	0.37	0.25	0.19	0.15
	60	F	VF	0.12	15	8.9	7.1	5.9	4.5	3.6	3.0	2.4	1.8	0.41	0.27	0.20	0.16
XR8001S XR11001S (100)	15	M	F	0.092	12	6.8	5.5	4.6	3.4	2.7	2.3	1.8	1.4	0.31	0.21	0.16	0.13
	20	F	F	0.11	14	8.2	6.5	5.4	4.1	3.3	2.7	2.2	1.6	0.37	0.25	0.19	0.15
	30	F	F	0.13	17	9.7	7.7	6.4	4.8	3.9	3.2	2.6	1.9	0.44	0.29	0.22	0.18
	40	F	F	0.15	19	11.1	8.9	7.4	5.6	4.5	3.7	3.0	2.2	0.51	0.34	0.26	0.20
	50	F	F	0.17	22	12.6	10.1	8.4	6.3	5.0	4.2	3.4	2.5	0.58	0.39	0.29	0.23
	60	F	F	0.18	23	13.4	10.7	8.9	6.7	5.3	4.5	3.6	2.7	0.61	0.41	0.31	0.24
XR8002 XR11002 (50)	15	M	M	0.12	15	8.9	7.1	5.9	4.5	3.6	3.0	2.4	1.8	0.41	0.27	0.20	0.16
	20	M	F	0.14	18	10.4	8.3	6.9	5.2	4.2	3.5	2.8	2.1	0.48	0.32	0.24	0.19
	30	F	F	0.17	22	12.6	10.1	8.4	6.3	5.0	4.2	3.4	2.5	0.58	0.39	0.29	0.23
	40	F	F	0.20	26	14.9	11.9	9.9	7.4	5.9	5.0	4.0	3.0	0.68	0.45	0.34	0.27
	50	F	F	0.22	28	16.3	13.1	10.9	8.2	6.5	5.4	4.4	3.3	0.75	0.50	0.37	0.30
	60	F	F	0.24	31	17.8	14.3	11.9	8.9	7.1	5.9	4.8	3.6	0.82	0.54	0.41	0.33
XR8002S XR11002S (50)	15	M	M	0.15	19	11.1	8.9	7.4	5.6	4.5	3.7	3.0	2.2	0.51	0.34	0.26	0.20
	20	M	M	0.18	23	13.4	10.7	8.9	6.7	5.3	4.5	3.6	2.7	0.61	0.41	0.31	0.24
	30	F	F	0.22	28	16.3	13.1	10.9	8.2	6.5	5.4	4.4	3.3	0.75	0.50	0.37	0.30
	40	F	F	0.25	32	18.6	14.9	12.4	9.3	7.4	6.2	5.0	3.7	0.85	0.57	0.43	0.34
	50	F	F	0.28	36	21	16.6	13.9	10.4	8.3	6.9	5.5	4.2	0.95	0.63	0.48	0.38
	60	F	F	0.31	40	23	18.4	15.3	11.5	9.2	7.7	6.1	4.6	1.1	0.70	0.53	0.42
XR8003 XR11003 (50)	15	M	M	0.18	23	13.4	10.7	8.9	6.7	5.3	4.5	3.6	2.7	0.61	0.41	0.31	0.24
	20	M	M	0.21	27	15.6	12.5	10.4	7.8	6.2	5.2	4.2	3.1	0.71	0.48	0.36	0.29
	30	M	F	0.26	33	19.3	15.4	12.9	9.7	7.7	6.4	5.1	3.9	0.88	0.59	0.44	0.35
	40	M	F	0.30	38	22	17.8	14.9	11.1	8.9	7.4	5.9	4.5	1.0	0.68	0.51	0.41
	50	F	F	0.34	44	25	20	16.8	12.6	10.1	8.4	6.7	5.0	1.2	0.77	0.58	0.46
	60	F	F	0.37	47	27	22	18.3	13.7	11.0	9.2	7.3	5.5	1.3	0.84	0.63	0.50
XR8003S XR11003S (50)	15	M		0.21	27	15.6	12.5	10.4	7.8	6.2	5.2	4.2	3.1	0.71	0.48	0.36	0.29
	20	M		0.25	32	18.6	14.9	12.4	9.3	7.4	6.2	5.0	3.7	0.85	0.57	0.43	0.34
	30	M		0.30	38	22	17.8	14.9	11.1	8.9	7.4	5.9	4.5	1.0	0.68	0.51	0.41
	40	M		0.35	45	26	21	17.3	13.0	10.4	8.7	6.9	5.2	1.2	0.79	0.60	0.48
	50	F		0.39	50	29	23	19.3	14.5	11.6	9.7	7.7	5.8	1.3	0.88	0.66	0.53
	60	F		0.43	55	32	26	21	16.0	12.8	10.6	8.5	6.4	1.5	0.97	0.73	0.58
XR8004 XR11004 (50)	15	C	M	0.24	31	17.8	14.3	11.9	8.9	7.1	5.9	4.8	3.6	0.82	0.54	0.41	0.33
	20	M	M	0.28	36	21	16.6	13.9	10.4	8.3	6.9	5.5	4.2	1.0	0.63	0.48	0.38
	30	M	M	0.35	45	26	21	17.3	13.0	10.4	8.7	6.9	5.2	1.2	0.79	0.60	0.48
	40	M	M	0.40	51	30	24	19.8	14.9	11.9	9.9	7.9	5.9	1.4	0.91	0.68	0.54
	50	F	F	0.45	58	33	27	22	16.7	13.4	11.1	8.9	6.7	1.5	1.0	0.77	0.61
	60	F	F	0.49	63	36	29	24	18.2	14.6	12.1	9.7	7.3	1.7	1.1	0.83	0.67
XR8005 XR11005 (50)	15	C	M	0.31	40	23	18.4	15.3	11.5	9.2	7.7	6.1	4.6	1.1	0.70	0.53	0.42
	20	C	M	0.35	45	26	21	17.3	13.0	10.4	8.7	6.9	5.2	1.2	0.79	0.60	0.48
	30	M	M	0.43	55	32	26	21	16.0	12.8	10.6	8.5	6.4	1.5	0.97	0.73	0.58
	40	M	M	0.50	64	37	30	25	18.6	14.9	12.4	9.9	7.4	1.7	1.1	0.85	0.68
	50	M	F	0.56	72	42	33	28	21	16.6	13.9	11.1	8.3	1.9	1.3	0.95	0.76
	60	F	F	0.61	78	45	36	30	23	18.1	15.1	12.1	9.1	2.1	1.4	1.0	0.83
XR8006 XR11006 (50)	15	C	C	0.37	47	27	22	18.3	13.7	11.0	9.2	7.3	5.5	1.3	0.84	0.63	0.50
	20	C	M	0.42	54	31	25	21	15.6	12.5	10.4	8.3	6.2	1.4	1.0	0.71	0.57
	30	M	M	0.52	67	39	31	26	19.3	15.4	12.9	10.3	7.7	1.8	1.2	0.88	0.71
	40	M	M	0.60	77	45	36	30	22	17.8	14.9	11.9	8.9	2.0	1.4	1.0	0.82
	50	M	M	0.67	86	50	40	33	25	19.9	16.6	13.3	9.9	2.3	1.5	1.1	0.91
	60	M	F	0.73	93	54	43	36	27	22	18.1	14.5	10.8	2.5	1.7	1.2	0.99
XR8008 XR11008 (50)	15	VC	C	0.49	63	36	29	24	18.2	14.6	12.1	9.7	7.3	1.7	1.1	0.83	0.67
	20	VC	C	0.57	73	42	34	28	21	16.9	14.1	11.3	8.5	1.9	1.3	0.97	0.78
	30	C	C	0.69	88	51	41	34	26	20	17.1	13.7	10.2	2.3	1.6	1.2	0.94
	40	M	M	0.80	102	59	48	40	30	24	19.8	15.8	11.9	2.7	1.8	1.4	1.1
	50	M	M	0.89	114	66	53	44	33	26	22	17.6	13.2	3.0	2.0	1.5	1.2
	60	M	M	0.98	125	73	58	49	36	29	24	19.4	14.6	3.3	2.2	1.7	1.3
XR8010† XR11010†	15	XC	VC	0.61	78	45	36	30	23	18.1	15.1	12.1	9.1	2.1	1.4	1.0	0.83
	20	VC	C	0.71	91	53	42	35	26	21	17.6	14.1	10.5	2.4	1.6	1.2	0.97
	30	C	C	0.87	111	65	52	43	32	26	22	17.2	12.9	3.0	2.0	1.5	1.2
	40	C	M	1.00	128	74	59	50	37	30	25	19.8	14.9	3.4	2.3	1.7	1.4
	50	C	M	1.12	143	83	67	55	42	33	28	22	16.6	3.8	2.5	1.9	1.5
	60	C	M	1.22	156	91	72	60	45	36	30	24	18.1	4.1	2.8	2.1	1.7
XR8015† XR11015†	15	XC	VC	0.92	118	68	55	46	34	27	23	18.2	13.7	3.1	2.1	1.6	1.3
	20	XC	VC	1.06	136	79	63	52	39	31	26	21	15.7	3.6	2.4	1.8	1.4
	30	VC	VC	1.30	166	97	77	64	48	39	32	26	19.3	4.4	2.9	2.2	1.8
	40	VC	C	1.50	192	111	89	74	56	45	37	30	22	5.1	3.4	2.6	2.0
	50	C	C	1.68	215	125	100	83	62	50	42	33	25	5.7	3.8	2.9	2.3
	60	C	C	1.84	236	137	109	91	68	55	46	36	27	6.3	4.2	3.1	2.5

Note: Always double check your application rates. Tabulations are based on spraying water at 70°F (21°C).
See pages 136–157 for drop size classification, useful formulas and other information. †Available in all stainless steel only.

CONTACT PRODUCT	SYSTEMIC PRODUCT	DRIFT MANAGEMENT
EXCELLENT	GOOD	GOOD
GOOD*	VERY GOOD*	VERY GOOD*

*At pressures below 30 PSI (2.0 bar)



Optimum Spray Height

	20°
80°	30"
110°	20"

How to order:

Specify tip number.
Examples:

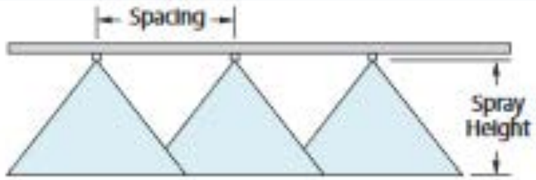
- XR8004VS – Stainless Steel with VisiFlo color-coding
- XR11004-VP – Polymer with VisiFlo color-coding (110° only)
- XR11004-VK – Ceramic with polypropylene VisiFlo color-coding
- XR8010SS – Stainless Steel
- XR11004VB – Brass with VisiFlo color-coding (110° only)

Extended Range Flat Spray Tips

	PSI	DROP SIZE 80°	DROP SIZE 130°	CAPACITY ONE NOZZLE IN GPM	CAPACITY ONE NOZZLE IN OZ./MIN.	20° GPA 4 MPH	5 MPH	6 MPH	8 MPH	10 MPH	12 MPH	15 MPH	20 MPH	GALLONS PER 1000 SQ. FT. 2 MPH	3 MPH	4 MPH	5 MPH
XR8001 XR11001 (100)	15	F	F	0.061	7.8	4.5	3.6	3.0	2.3	1.8	1.5	1.2	0.91	0.21	0.14	0.10	0.08
	20	F	F	0.071	9.1	5.3	4.2	3.5	2.6	2.1	1.8	1.4	1.1	0.24	0.16	0.12	0.10
	30	F	F	0.087	11	6.5	5.2	4.3	3.2	2.6	2.2	1.7	1.3	0.30	0.20	0.15	0.12
	40	F	F	0.10	13	7.4	5.9	5.0	3.7	3.0	2.5	2.0	1.5	0.34	0.23	0.17	0.14
	50	F	F	0.11	14	8.2	6.5	5.4	4.1	3.3	2.7	2.2	1.6	0.37	0.25	0.19	0.15
	60	F	VF	0.12	15	8.9	7.1	5.9	4.5	3.6	3.0	2.4	1.8	0.41	0.27	0.20	0.16
	15	M	F	0.092	12	6.8	5.5	4.6	3.4	2.7	2.3	1.8	1.4	0.31	0.21	0.16	0.13

CONTACT PRODUCT	SYSTEMIC PRODUCT	DRIFT MANAGEMENT
EXCELLENT	GOOD	GOOD
GOOD*	VERY GOOD*	VERY GOOD*

*At pressures below 30 PSI (2.0 bar)



Optimum Spray Height

	20°
80°	30"
110°	20"

Extension

Confirm Sprayer Output

- Calculate each nozzle's output across the manifold.

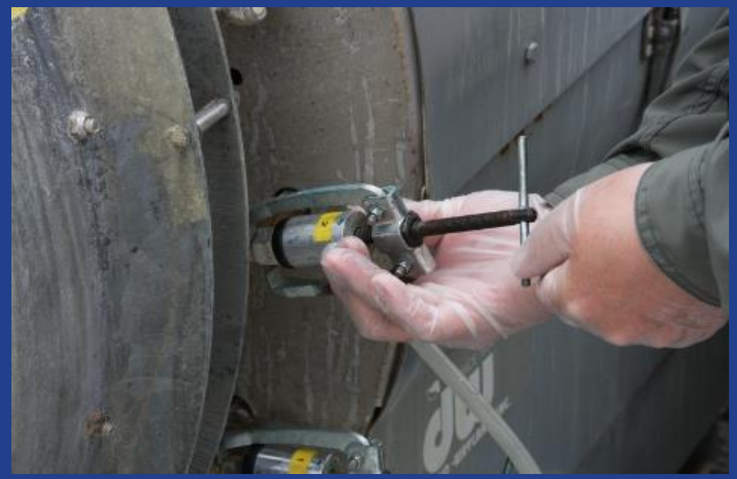
NH Extension

Collect Spray for the Given Number of Seconds

There Are Devices That Calculate The Flow Rate.

NH Extension

Confirm Sprayer Output



NH Extension

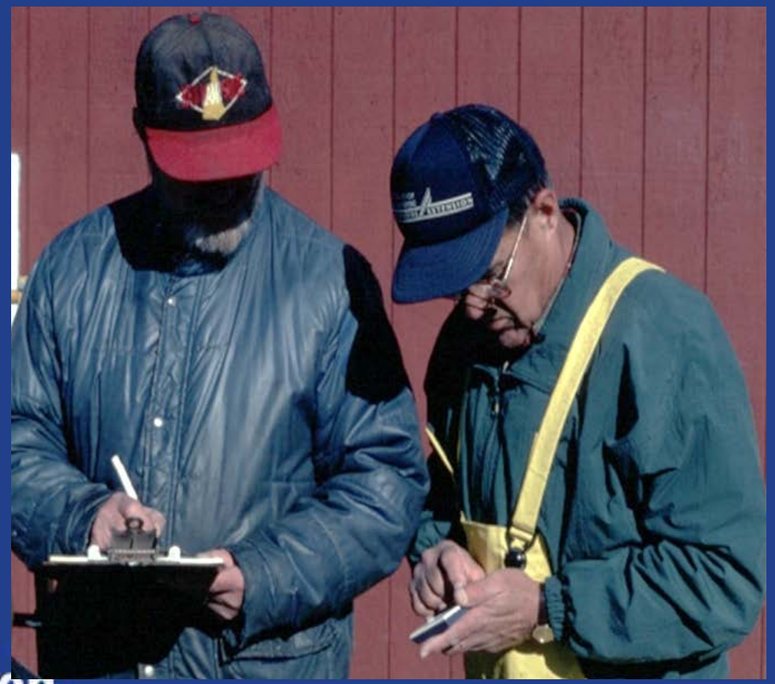
Confirm Sprayer Output

Extension

Calculating Gallons per Acre

Block (#_____) Minutes/Acre = $\frac{\text{Linear Feet Row per Acre}}{\text{Feet per Minute}}$ = (_____) / (_____) = (_____) Minutes/Acre

Arrangement Nozzles (#_____) GPA = GPM **X** MPA = (_____) GPM **X** (_____) MPA = (_____)GPA



Extension

When to Calibrate?

- Recalibrate the sprayer at the beginning of the season, mid-season and recheck periodically
- By law you need to calibrate **before** you spray,
- **Every time** you spray, double check does the gallonage applied equal acreage sprayed
- Keep good records of your spray and calibration programs

Extension

Spray Coverage

Use a patternator for boom sprayers. Place the patternator on the ground under the boom. Spray for 30 seconds to one minute, then tip up the patternator to see the amount of spray delivered to each cell. It is quick and easy see the spray distribution.

Spray Coverage

Single nozzle pattern –
showing the need for the 20 to 30 percentage overlap needed for uniform coverage

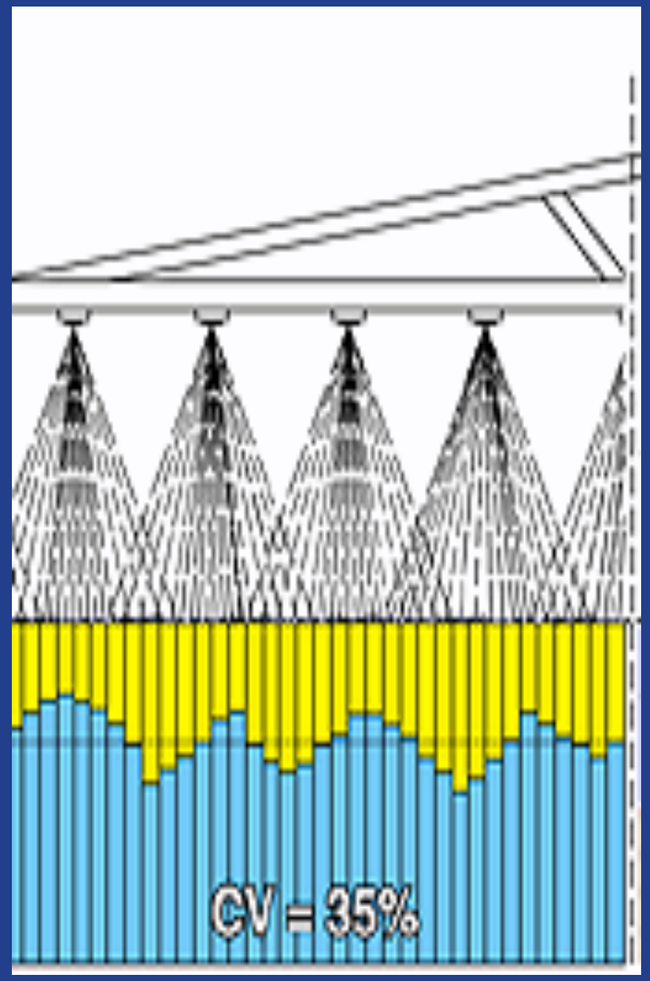
Extension

Spray Coverage

<u>Worn Spray Tips</u>

Have a higher output with more spray

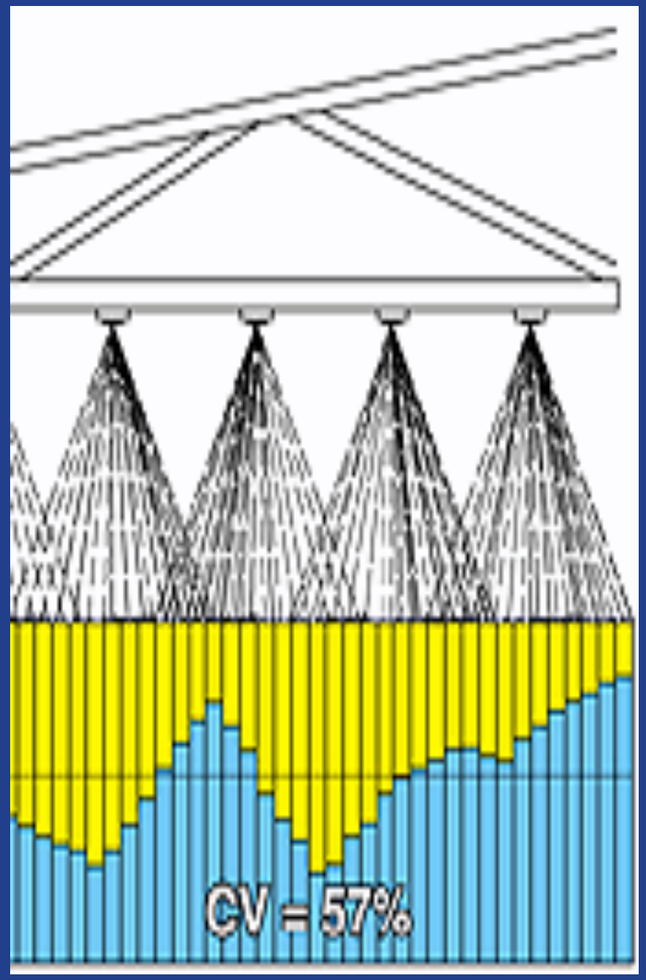
Concentrated under tip



Spray Coverage

<u>Damaged Spray Tips</u>

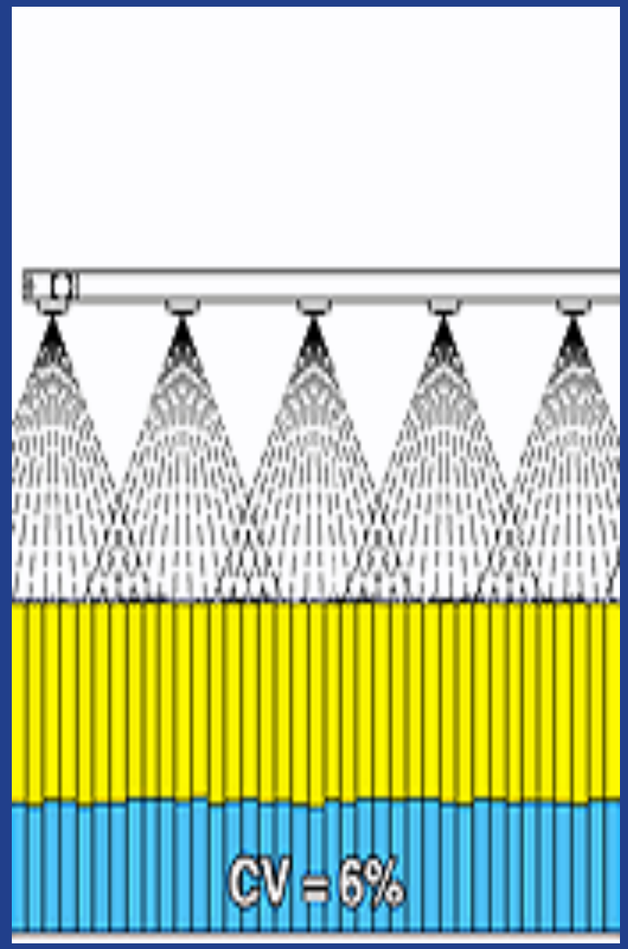
Have a erratic output – over-applying and under-applying



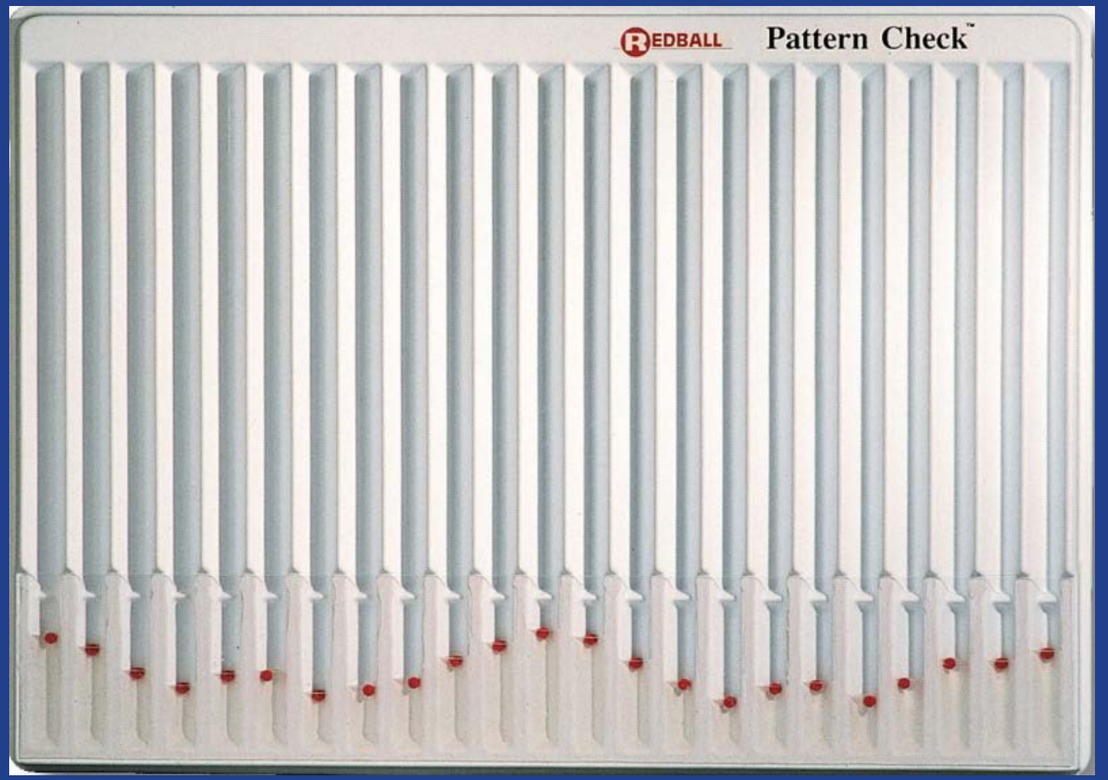
Spray Coverage

New Spray Tips

Produce a uniform distribution when properly overlapped and distance from spray tip to target



Spray Coverage



Improper distance from spray tip to patternator (target) creates a waving output

NH Extension

Extension

Spray Coverage

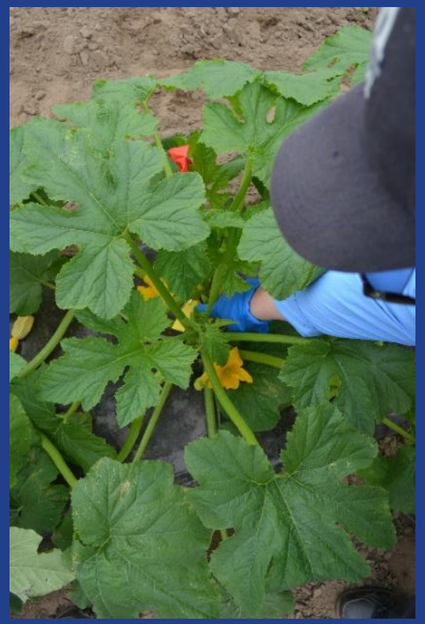
You may be able to visualize the pattern by spraying a dry farm roadway (dirt or paved) or a long, flat patch of concrete. If gaps or heavy patches show up, make adjustments. It is difficult to quantify differences using this method, but it is quick and simple.

Spray Coverage

Using Water Sensitive Paper To Determine Coverage

Extension

Water Sensitive Paper Indicates Coverage



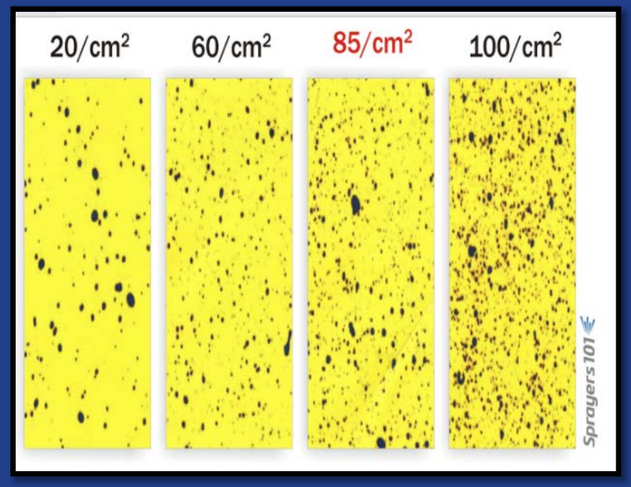
Extension

Confirm Spray Coverage

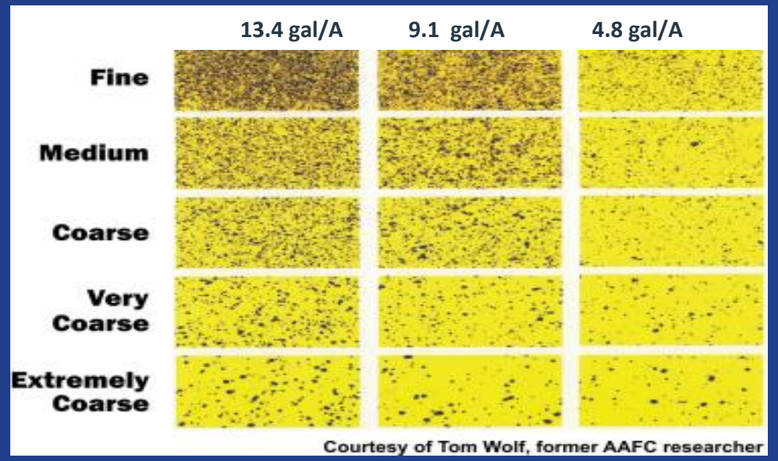
Use water sensitive paper to confirm spray is reaching the target!

- It's debatable, but 85 fine/medium-sized drops per square centimeter, and about 15% - 20% total surface covered is adequate coverage for most pesticides. At 30%, droplets overlap too much, and it is difficult to count them.

- However, as the crop grows throughout the season you may need to adjust amount of water per acre to get the same coverage.

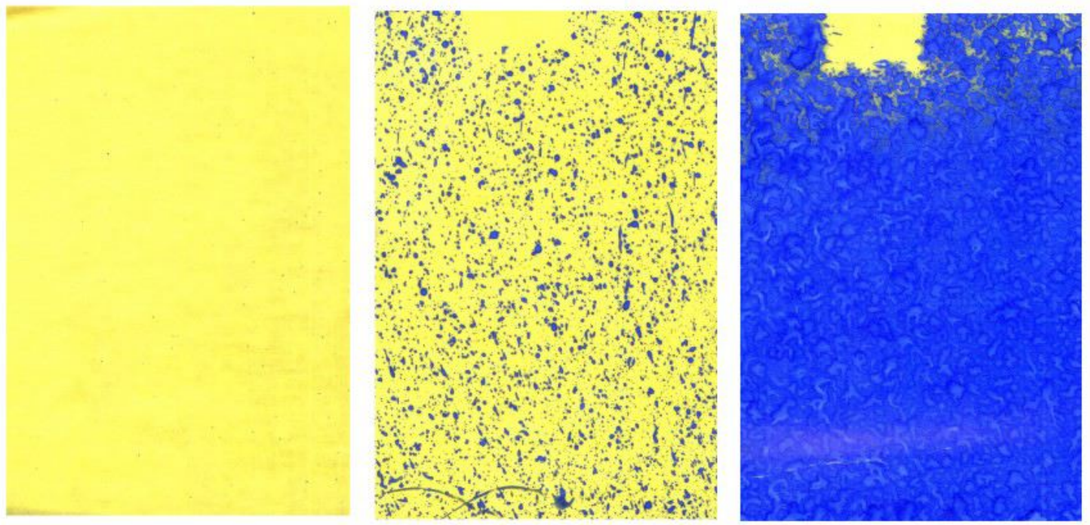


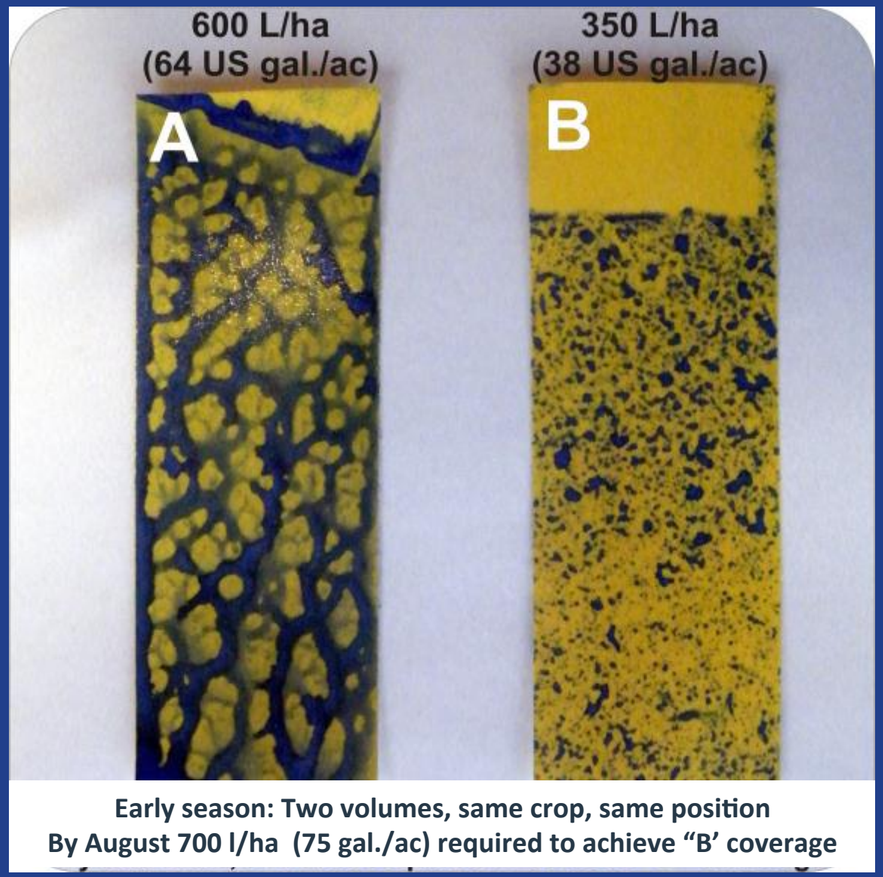
Dr. Jason S.T. Deveau
Application Technology Specialist
OMAFRA



Courtesy of Tom Wolf, former AAFC researcher

NH Extension


Not Enough
About Right
Too Much



Early season: Two volumes, same crop, same position
By August 700 l/ha (75 gal./ac) required to achieve “B’ coverage

Nozzles and Volume

One setting for your sprayer will not suffice for the whole season.

Extension

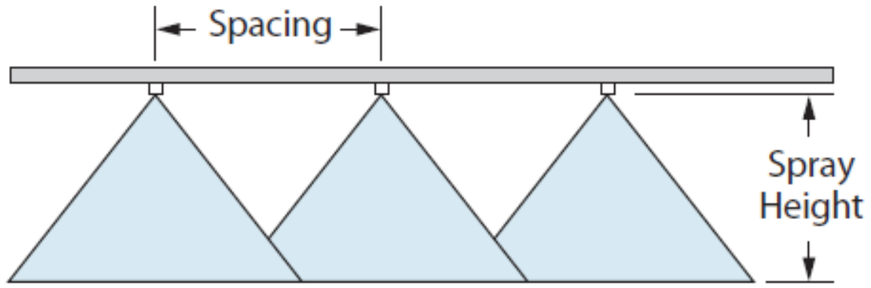
Dr. Jason S.T. Deveau
Application Technology Specialist
OMAFRA

Consider Using Purchasing Air-Assist Boom Sprayer

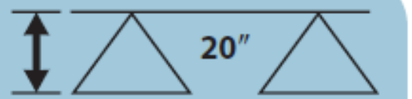
Extension

Use of Different Spray Types

Air Induction Flat Spray Tips



Optimum Spray Height

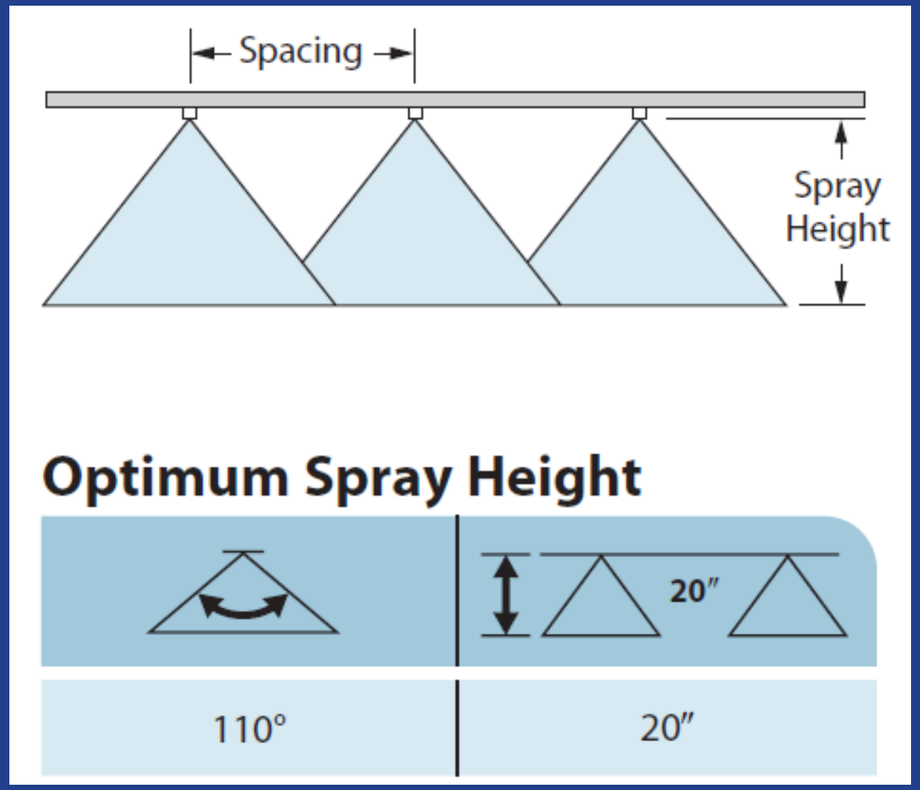
	 20″
80°	30″
110°	20″

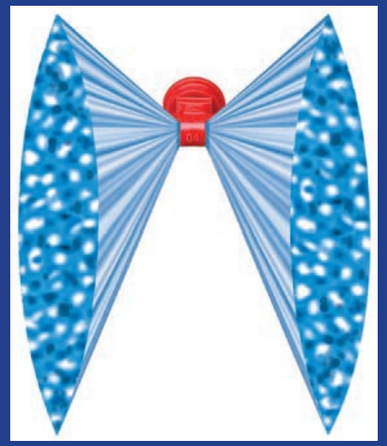
CONTACT PRODUCT	SYSTEMIC PRODUCT	DRIFT MANAGEMENT
GOOD	EXCELLENT	EXCELLENT

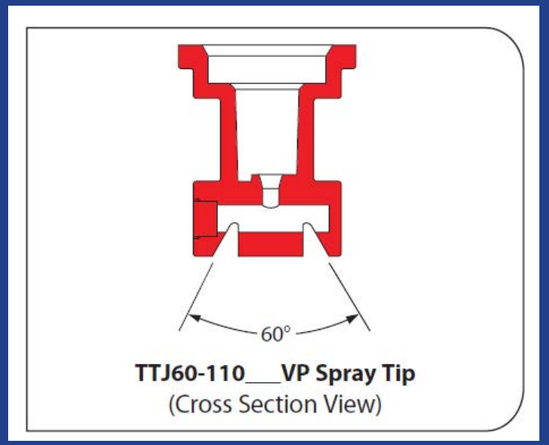
NH Extension

Use of Different Spray Types

Twin Flat Spray Tips







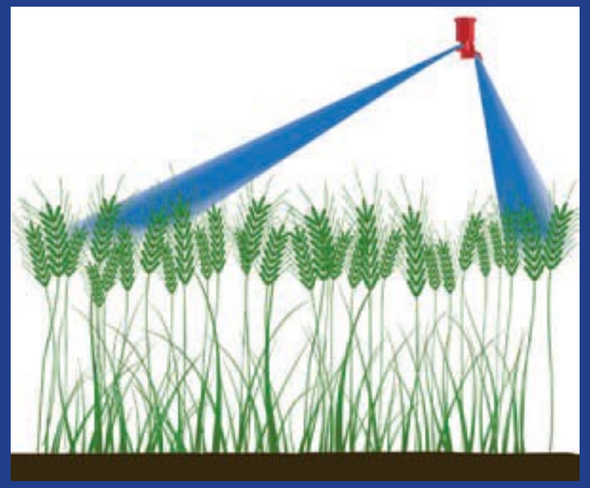
CONTACT PRODUCT	SYSTEMIC PRODUCT	DRIFT MANAGEMENT
EXCELLENT	EXCELLENT	VERY GOOD
VERY GOOD*	EXCELLENT*	EXCELLENT*

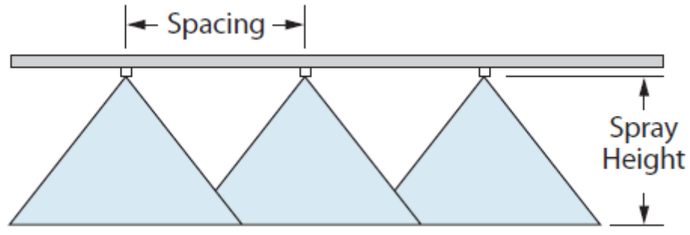
*At pressures below 30 PSI (2.0 bar)

NH Extension

Use of Different Spray Types

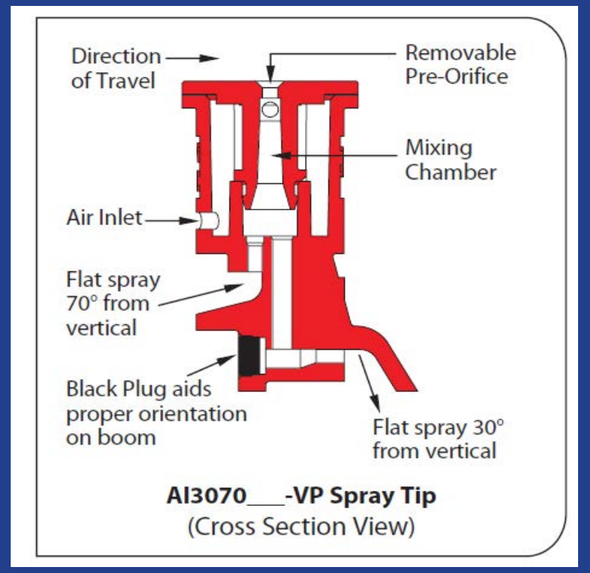
Air Induction Dual Pattern Flat Spray Tips
30° forward tilted spray penetrates dense crop canopies, while the backward tilted 70° spray maximizes coverage of the crop





Optimum Spray Height

15″	9″
20″	12″
30″	18″



AI3070___-VP Spray Tip
(Cross Section View)

CONTACT PRODUCT	SYSTEMIC PRODUCT	DRIFT MANAGEMENT
EXCELLENT	VERY GOOD	EXCELLENT

NH Extension

Coming and Going

- Change your starting point and the direction in which you spray to avoid running out of product in the same spot every time or over- or under-applying in any spot.

- If you spray up a given row this time, spray down that row next time.

Extension

Take Home!

- One calibration setup for the growing season will NOT guarantee proper spray coverage for the whole season.

- Calibration is a three-step process:
  - First - inspection
  - Second - output per given area
  - Third - spray coverage

- Check calibration based on volume used and field size.

NH Extension

Remember With All Pesticides

Always Read And Follow
All Label Directions!

THE LABEL IS THE LAW!

Extension

Can of Air

- Use a compressed air can—the kind you use to clean a computer keyboard—to clean out your nozzles.

- Don’t try to blow out dirt or residue with your mouth, and don’t use a metal implement, like a paper clip, as this can distort the nozzle opening.

Extension

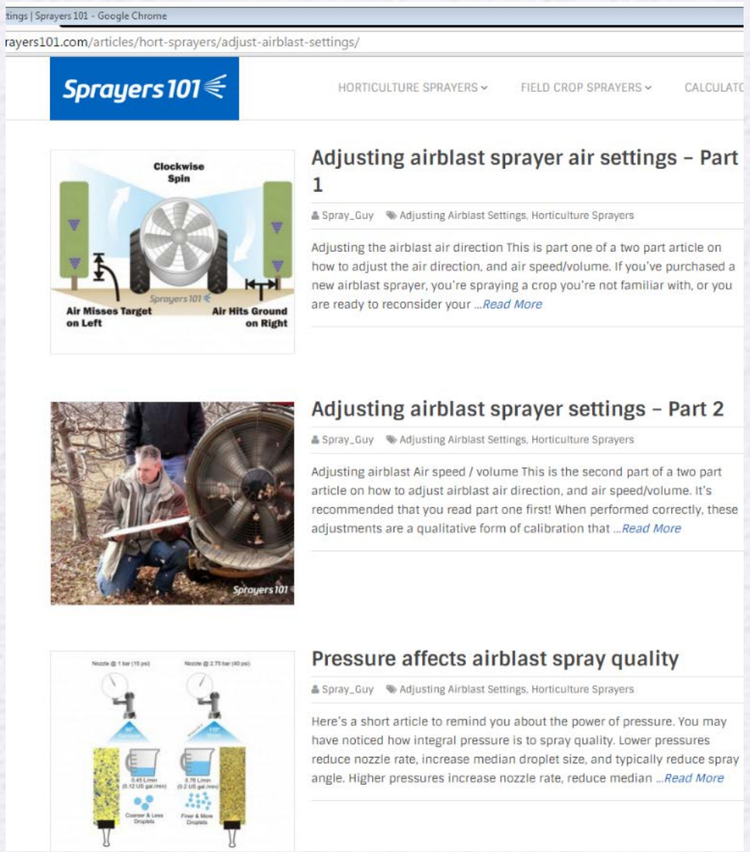
http://sprayers101.com

Dr. Jason Deveau

Application Technology Specialist with OMAFRA in Ontario

http://sprayers101.com

TONS of great information to make your applications and spray placement more accurate



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