



# A Lesson in Spray Quality and Droplet Size

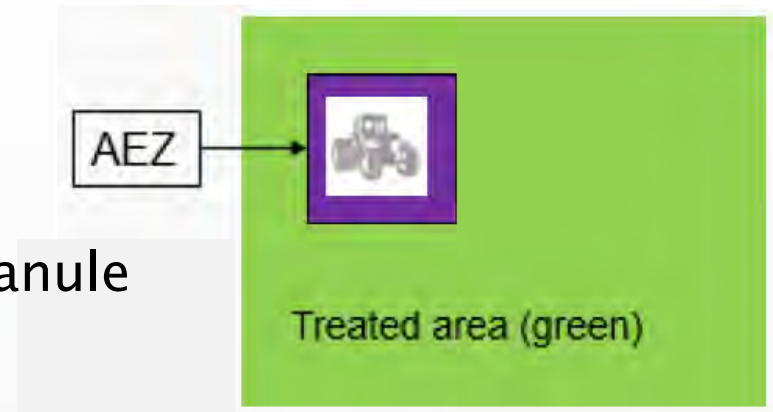
Carol Black  
Extension Specialist  
Washington State University





# Application Exclusion Zone in Outdoor Production

- EPA will explain in next talk
- Distance determined by
  - Application equipment – spray/granule
    - Air
    - Airblast
    - Fumigant, mist, fog
  - If spray
    - droplet spectrum, noted at 294 microns
    - Medium spray using VMD >294 microns



Let's Talk about Droplets and Spray Quality



## Terminology - Micron – $\mu\text{m}$

One micron ( $\mu\text{m}$ ) = 1/25,000 inch = 1/1,000 millimeter

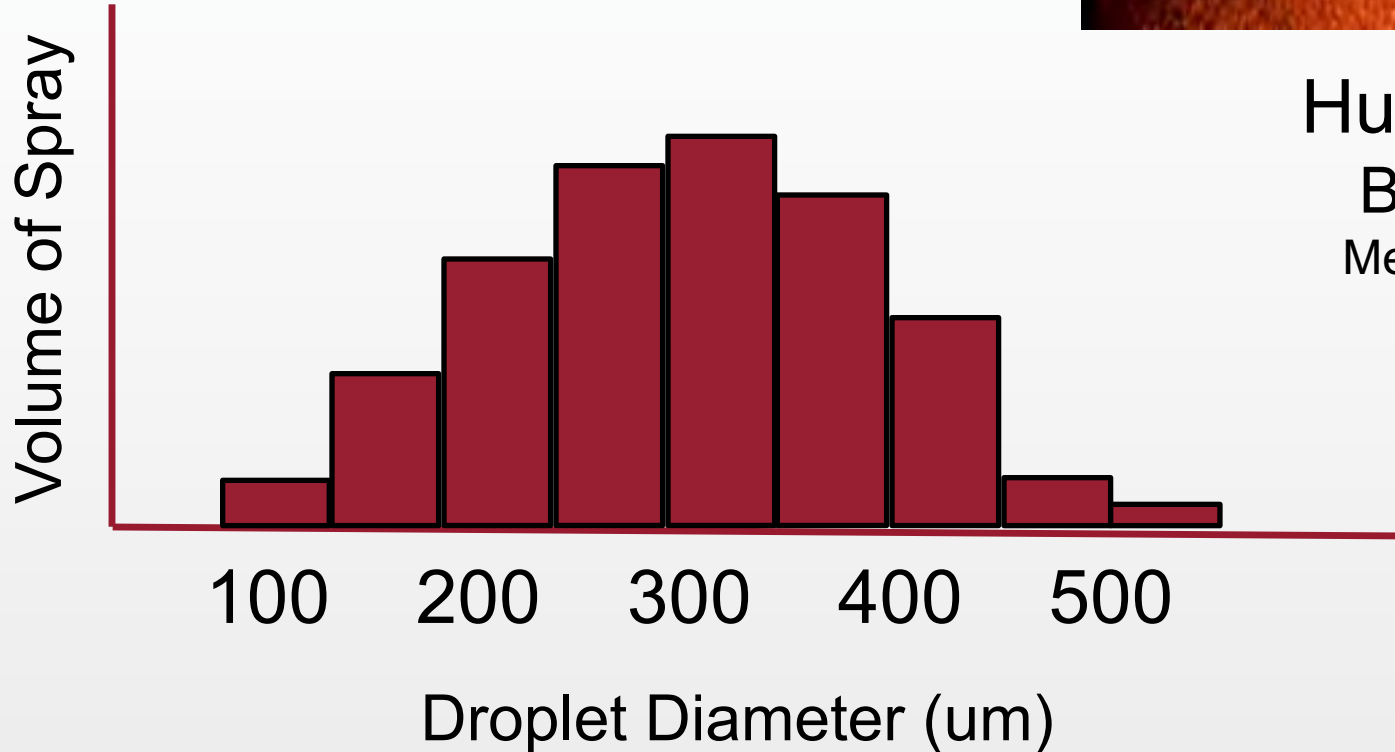
pencil lead	2000 ( $\mu\text{m}$ )	thunderstorm rain
paper clip	850 ( $\mu\text{m}$ )	heavy rain
staple	420 ( $\mu\text{m}$ )	light rain
toothbrush bristle	300 ( $\mu\text{m}$ )	heavy drizzle
sewing thread	150 ( $\mu\text{m}$ )	fine drizzle
human hair	100 ( $\mu\text{m}$ )	fine mist
point of a needle	1-25 ( $\mu\text{m}$ )	fog

Driftable fines under 150  $\mu\text{m}$



# Spray Spectrum = Quality

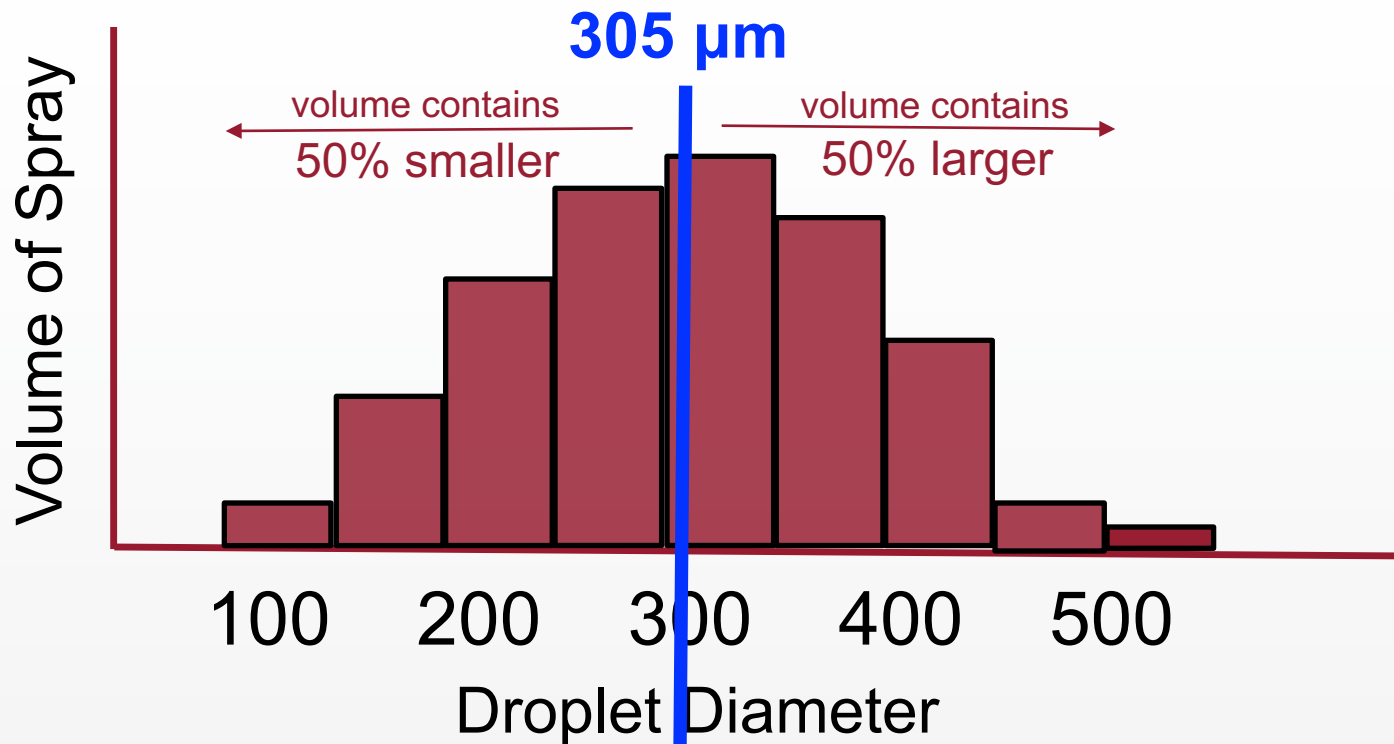
Put all the Same Similar Sized Droplets in a Test Tube



Huge drops  
Big drops  
Medium drops  
Small drops  
Tiny drops



# Spray Quality and the VMD (volume median diameter)



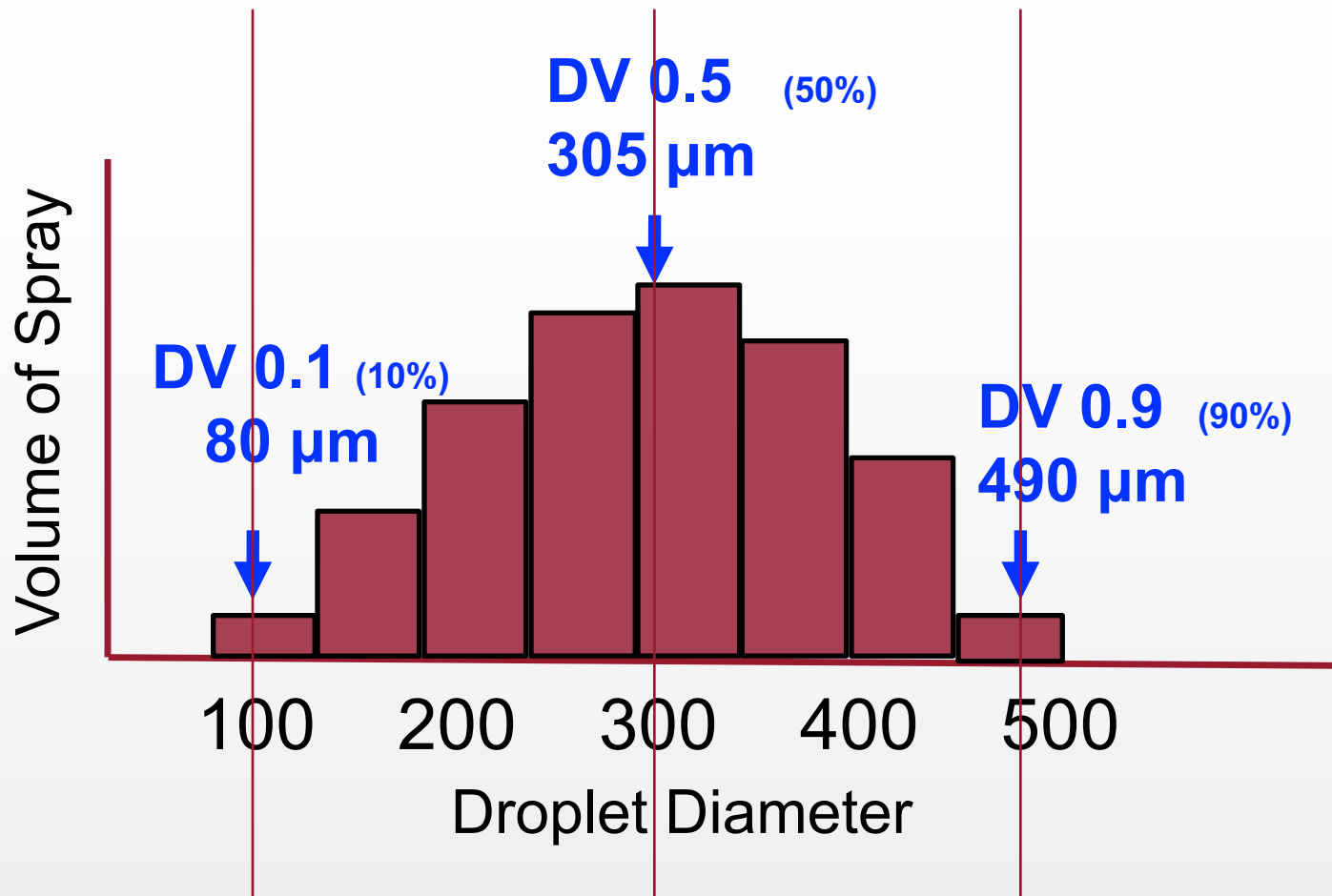
**VMD - volume median diameter -  $D_{v0.5}$  (50%)**

**Half the total spray volume is smaller and half is larger**

*This is the MEDIAN, not the average*

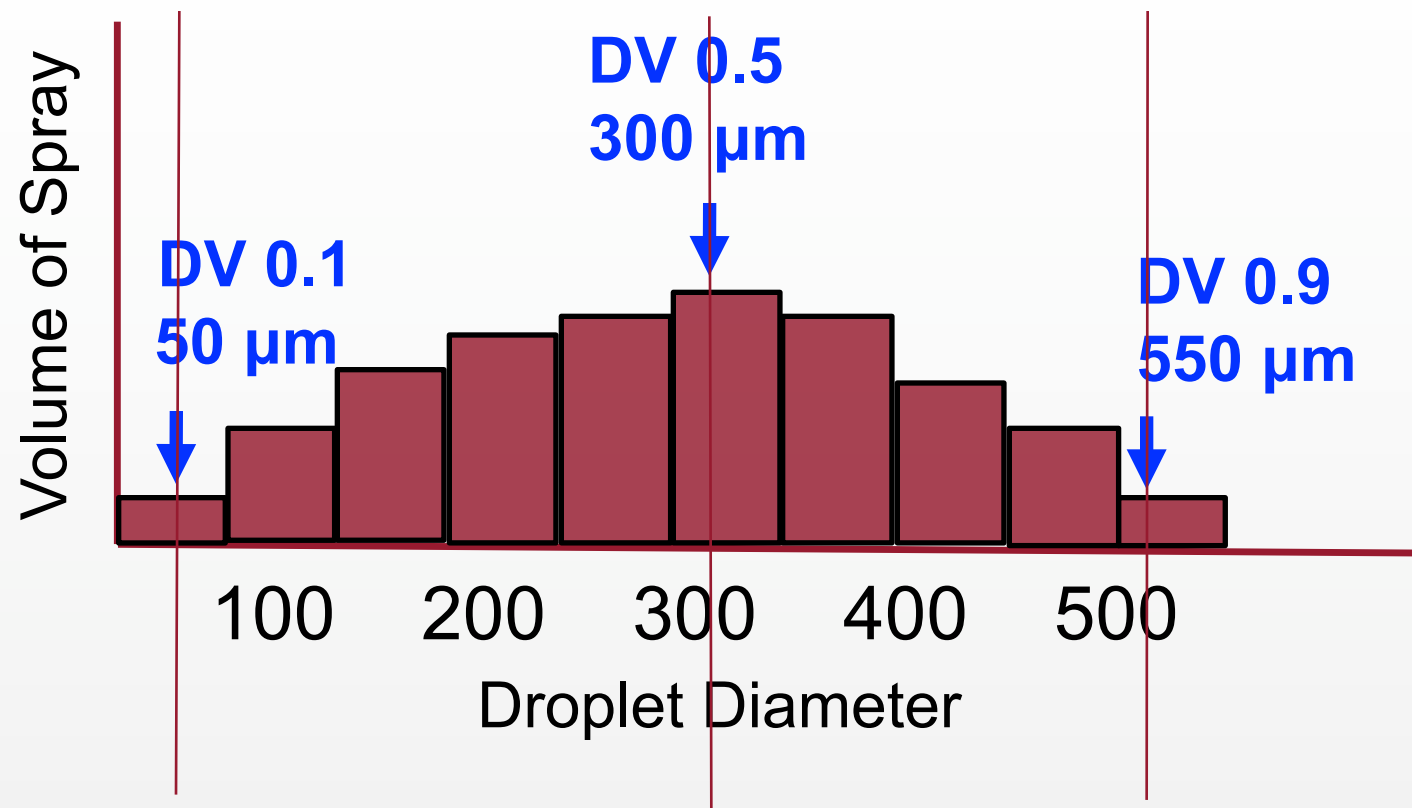


# Spray Quality - Explained





# Spray Quality - Explained



Similar VMD  
Lot's more fines:  $< 150 \mu\text{m}$   
Lot's more basketballs:  $> 500 \mu\text{m}$



## Spray Quality Categories

### ASABE Standard S-572.1

Category (symbol)	Color Code
Extra Fine (XF)	Purple
Very Fine (VF)	Red
Fine (F)	Orange
Medium (M)	Yellow
Coarse (C)	Blue
Very Coarse (VC)	Green
Extra Coarse (XC)	White
Ultra Coarse (UC)	Black

## Spray Quality

Based on ASABE  
572.1 Standards

Referenced in  
nozzle charts

American Society of  
Agricultural and Biological  
Engineers





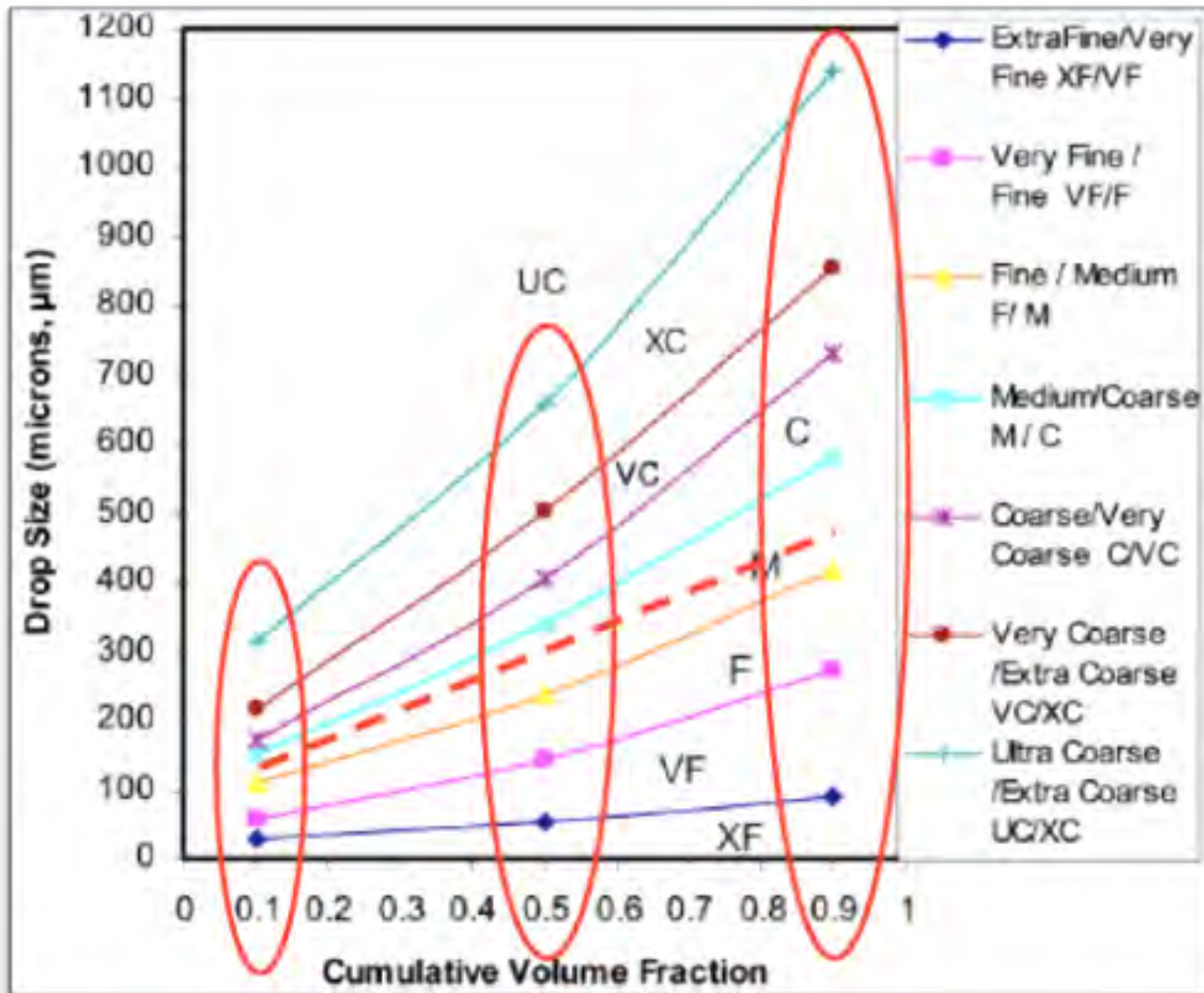
## Droplet Sizing

- Measured with a **laser-based instrument**. Both reference and nozzles to be classified
- Verification and calibration to known standards essential
- Nozzle oriented to scan the entire spray plume
- Ensure a representative cross-sectional sample of the spray plume is obtained





## ASABE 572.1 Spray Quality Standard Plot Volume (---) of Droplet Sizes on a Reference Graph





# Spray Quality

## ASABE S572.1 Droplet Size Classification

The American Society of Agricultural and Biological Engineers (ASABE) developed the ASABE S572.1 standard to measure and interpret spray quality from tips.

Spray Quality*	Size of Droplets	VMD Range (Microns**)	Color Code	Retention on Difficult to Wet Leaves	Used for	Drift Potential
Extremely Fine	Small	<60	Purple	Excellent	Exceptions	High
Very Fine		61-105	Red	Excellent	Exceptions	
Fine		106-235	Orange	Very Good	Good Cover	
Medium		236-340	Yellow	Good	Most Products	
Coarse		341-403	Blue	Moderate	Systemic Herbicides	
Very Coarse		404-502	Green	Poor	Soil Herbicides	
Extremely Coarse		503-665	White	Very Poor	Liquid Fertilizer	
Ultra Coarse	Large	>665	Black	Very Poor	Liquid Fertilizer	Low

\*Always read the pesticide label to determine which spray quality is required.

\*\*Estimated from sample reference graph in ASABE/ANSI/ASAE Standard S572.1

ASABE S572.1 standard uses eight droplet classification categories, six of which are common for agriculture and horticulture.

Very Fine

Fine

Medium

Coarse

Very Coarse

Extremely Coarse



## Spray Quality Categories

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## TXR ConeJet® Hollow Cone Spray Tips

See Pages 20 & 42



**Spray Quality Color  
does not  
equate to  
Nozzle Color**



## AI3070 Air Induction Dual Pattern Flat Spray Tips

See Page 18





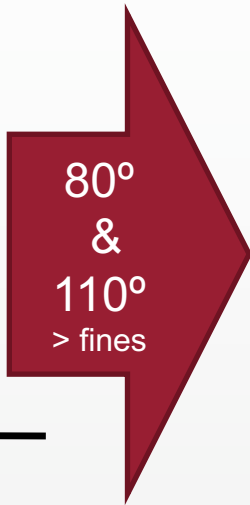
# The Color Confusion Challenge: Tips and Spray Quality

XR TeeJet® (XR)

XR TeeJet® (XR)	PSI						
	15	20	25	30	40	50	60
XR8001	F	F	F	F	F	F	F
XR80015	M	F	F	F	F	F	F
XR8002	M	M	F	F	F	F	F
XR80025	M	M	F	F	F	F	F
XR8003	M	M	M	F	F	F	F
XR80035	M	M	M	M	M	F	F
XR8004	C	M	M	M	M	F	F
XR8005	C	C	M	M	M	M	F
XR8006	C	C	C	M	M	M	M
XR8008	VC	VC	C	C	M	M	M
XR8010	XC	VC	VC	C	C	C	C
XR8015	XC	XC	VC	VC	VC	C	C
XR11001	F	F	F	F	F	F	VF
XR110015	F	F	F	F	F	F	F
XR11002	M	F	F	F	F	F	F
XR110025	M	M	F	F	F	F	F
XR11003	M	M	M	F	F	F	F
XR11004	M	M	M	M	M	F	F
XR11005	M	M	M	M	M	F	F
XR11006	C	M	M	M	M	M	F
XR11008	C	C	C	C	M	M	M
XR11010	VC	C	C	C	M	M	M
XR11015	VC	VC	VC	VC	C	C	C

80°

110°



XR TeeJet® (XR)	PSI	DROP SIZE		
		80°	110°	
XR8001	15	F	F	
XR11001 (100)	20	F	F	
	30	F	F	
	40	F	F	
	50	F	F	
XR80015	60	F	VF	
	15	M	F	
	XR110015 (100)	20	F	F
		30	F	F
40		F	F	
50		F	F	
XR8002	60	F	F	
	15	M	M	
	XR11002 (50)	20	M	F
		30	F	F
40		F	F	
50		F	F	
XR80025	60	F	F	
	15	M	M	
	XR110025 (50)	20	M	M
		30	F	F
40		F	F	
50		F	F	
XR8003	60	F	F	
	15	M	M	
	XR11003 (50)	20	M	M
		30	F	F
40		F	F	
50		F	F	
XR80035 (50)	60	F	F	
	15	M		
	20	M		
	30	M		
XR80035 (50)	40	M		
	50	F		
	60	F		

XR TeeJet® (XR)	PSI	DROP SIZE		
		80°	110°	
XR8004	15	C	M	
XR11004 (50)	20	M	M	
	30	M	M	
	40	M	M	
	50	F	F	
XR8005	60	F	F	
	15	C	M	
	XR11005 (50)	20	C	M
		30	M	M
40		M	M	
50		M	F	
XR8006	60	M	F	
	15	C	C	
	XR11006 (50)	20	C	M
		30	M	M
40		M	M	
50		M	M	
XR8008	60	M	F	
	15	VC	C	
	XR11008 (50)	20	VC	C
		30	C	C
40		M	M	
50		M	M	
XR8010†	60	M	M	
	15	XC	VC	
	XR11010†	20	VC	C
		30	C	C
40		C	M	
50		C	M	
XR8015†	60	C	M	
	15	XC	VC	
	XR11015†	20	XC	VC
		30	VC	VC
40		VC	C	
50		C	C	
60	C	C		



# A Closer Look

GPA  
&  
MPH

Nozzle  
Color

PSI


Spray  
Quality

Type of Nozzle


Nozzle Color	PSI	Type of Nozzle									GPM	GPA & MPH		
		110°XR/XRC	TT	TTJ60	AIXR	AI3070	AITTJ60	110°AI/AIC	TTI	4 mph		5 mph	6 mph	
	PSI	15-60 PSI	15-90 PSI	20-90 PSI	15-90 PSI	20-90 PSI	20-90 PSI	30-115 PSI	15-100 PSI					
01 TT XR (100)	20	F	C	—	—	—	—	—	—	0.071	5.3	4.2	3.5	
	30	F	M	—	—	—	—	—	—	0.087	6.5	5.2	4.3	
	40	F	M	—	—	—	—	—	—	0.10	7.4	5.9	5.0	
	50	F	M	—	—	—	—	—	—	0.11	8.2	6.5	5.4	
	60	VF	F	—	—	—	—	—	—	0.12	8.9	7.1	5.9	
	70	—	F	—	—	—	—	—	—	0.13	9.7	7.7	6.4	
	80	—	F	—	—	—	—	—	—	0.14	10.4	8.3	6.9	
015 AI AIC AIXR AI3070 TT TTI XR XRC (100)	20	F	C	—	VC	VC	—	—	UC	0.11	8.2	6.5	5.4	
	30	F	M	—	C	C	—	UC	UC	0.13	9.7	7.7	6.4	
	40	F	M	—	C	M	—	XC	UC	0.15	11.1	8.9	7.4	
	50	F	M	—	M	M	—	VC	UC	0.17	12.6	10.1	8.4	
	60	F	F	—	M	M	—	VC	XC	0.18	13.4	10.7	8.9	
	70	—	F	—	M	M	—	VC	XC	0.20	14.9	11.9	9.9	
	80	—	F	—	M	F	—	VC	XC	0.21	15.6	12.5	10.4	
90	—	F	—	M	F	—	C	XC	0.23	17.1	13.7	11.4		
	PSI	15-60	15-90	20-90	15-90	20-90	20-90	30-115	15-100					

# Variety and Selection


AIXR TeeJet® (AIXR)

	PSI										
	15	20	25	30	35	40	50	60	70	75	90
AIXR110015	XC	XC	VC	C	C	C	C	M	M	M	M
AIXR11002	XC	XC	XC	VC	VC	C	C	C	C	M	M
AIXR110025	XC	XC	XC	XC	VC	VC	C	C	C	C	C
AIXR11003	XC	XC	XC	XC	VC	VC	C	C	C	C	C
AIXR11004	UC	XC	XC	XC	XC	XC	VC	VC	C	C	C
AIXR11005	UC	XC	XC	XC	XC	XC	VC	VC	C	C	C
AIXR11006	UC	XC	XC	XC	XC	XC	VC	VC	VC	C	C


Turbo TeeJet® Induction (TTI)

	PSI											
	15	20	25	30	35	40	50	60	70	80	90	100
TTI110015	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC	XC
TTI11002	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC
TTI110025	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC
TTI11003	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC
TTI11004	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC
TTI11005	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC
TTI11006	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC

DG TeeJet (DG)

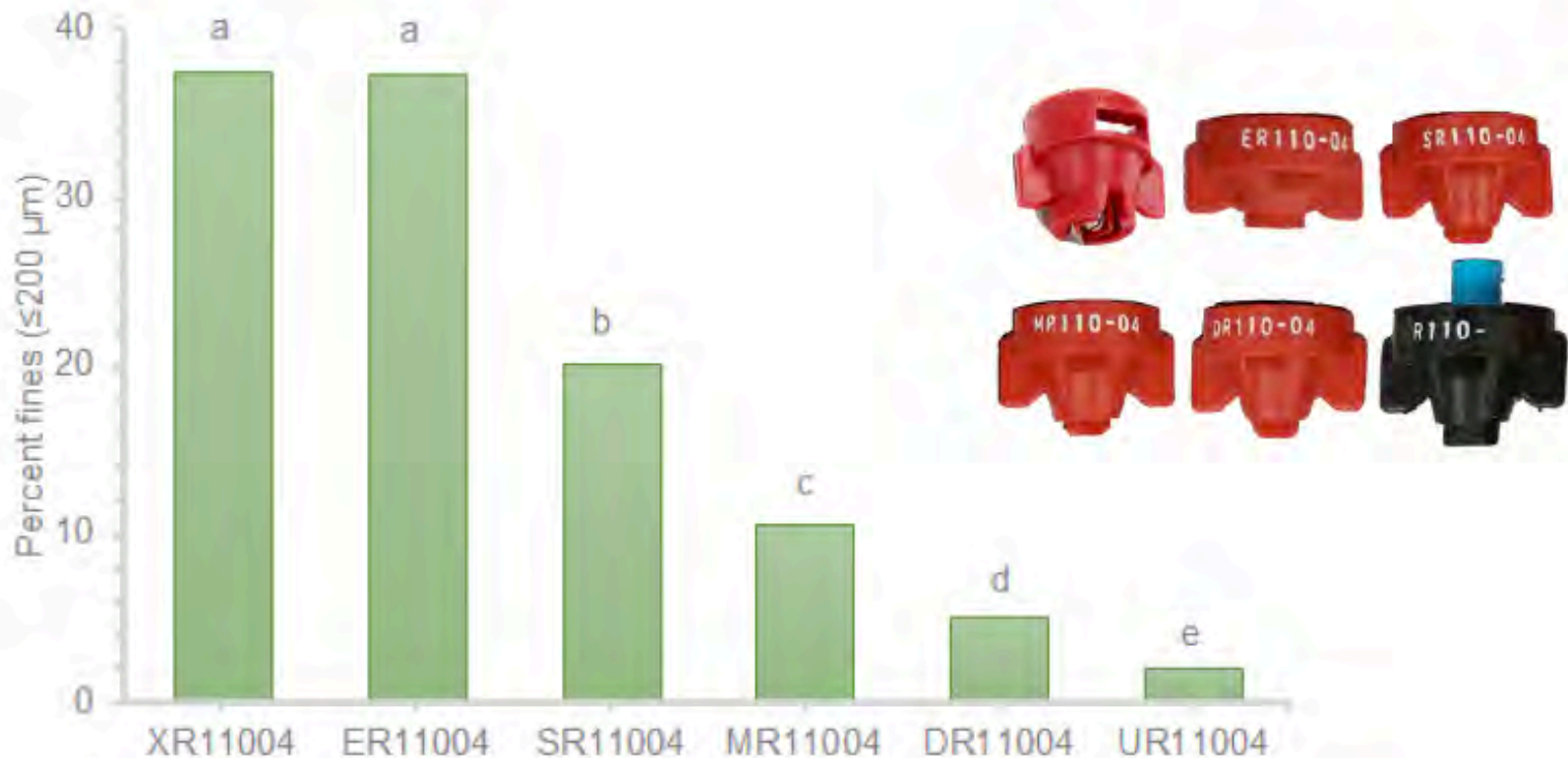
	PSI				
	30	35	40	50	60
DG80015	M	M	M	M	F
DG8002	M	M	M	M	M
DG8003	C	M	M	M	M
DG8004	C	C	C	M	M
DG8005	C	C	C	M	M
DG110015	M	M	F	F	F
DG11002	M	M	M	M	M
DG11003	C	M	M	M	M
DG11004	C	C	M	M	M
DG11005	C	C	C	M	M

Turbo TeeJet® (TT)

	PSI										
	15	20	25	30	35	40	50	60	70	80	90
TT11001	C	C	M	M	M	M	M	F	F	F	F
TT110015	VC	C	C	M	M	M	M	F	F	F	F
TT11002	VC	VC	C	C	M	M	M	M	F	F	F
TT110025	VC	VC	C	C	M	M	M	M	F	F	F
TT11003	VC	VC	C	C	C	C	M	M	M	M	F
TT11004	XC	VC	VC	C	C	C	M	M	M	M	M
TT11005	XC	VC	VC	VC	VC	C	C	M	M	M	M
TT11006	XC	VC	VC	VC	VC	VC	C	C	C	M	M
TT11008	XC	VC	VC	VC	VC	C	C	C	C	M	M

# Droplet Sizes Vary Among Nozzle Types

--- % of fines - less than 200  $\mu\text{m}$



† **Figure 6.** Comparison of percent of fine droplets ( $\leq 200 \mu\text{m}$ ) for six non-venturi nozzles.





# Nozzles Today...



TwinJet®



Drift Guard  
TwinJet®



Turbo  
TwinJet®



Air Induction  
3070



Air Induction  
Turbo TwinJet®

Fine

Coarse



XR



Turbo  
TeeJet®



Air Induction  
XR



Air Induction  
TeeJet®



Turbo TeeJet®

Quick Turbo  
FloodJet®





## XR Flat Fan Nozzle



Images from  
Spraying Systems

Turbo TeeJet Induction (TTI)

**Older and Newer  
Nozzle Designs**





# Nozzle Comparison - 40 PSI Wind XR, AI, AIXR TeeJet®

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**WINFIELD™**



# Pressure Comparison Wind - 10-80 PSI AI TeeJet® AI11002

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10

20

30

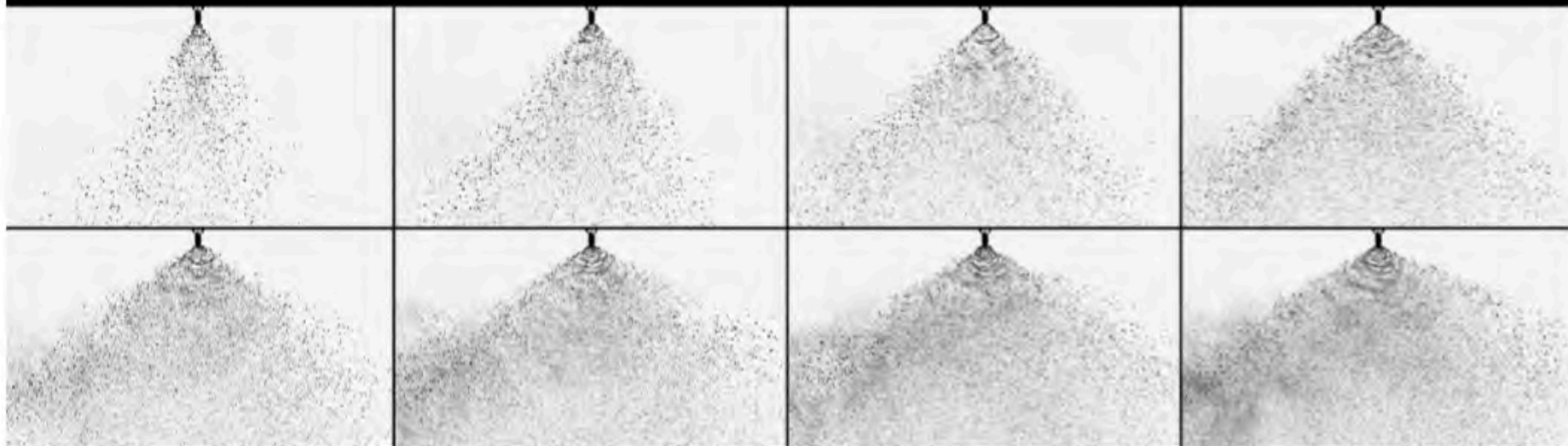
40

50

60

70

80



Water

WINFIELD



# Causes of Spray Drift

## 1. Applicator - Decision Maker

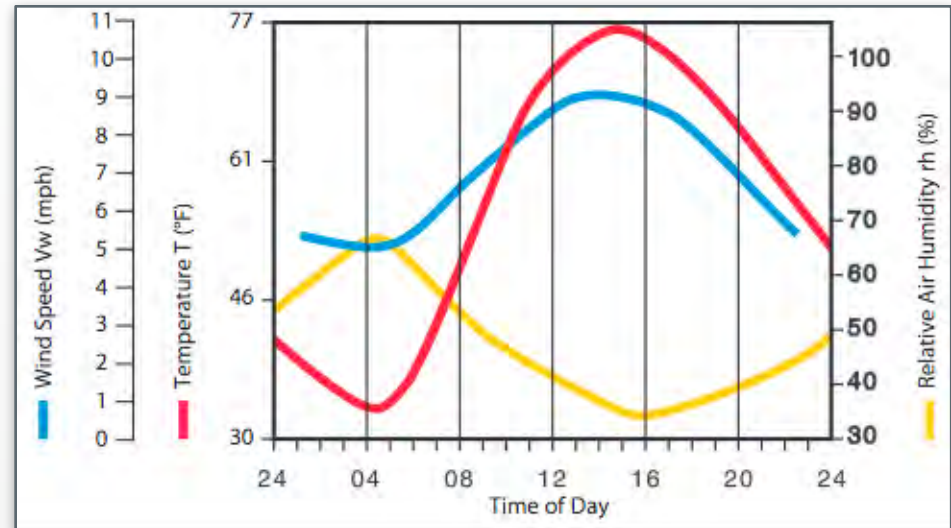
- To Spray or **Not to Spray** – to **Stop Spraying**
- Equipment Set Up
- Assesses the Weather

## 2. Equipment

- Droplet Size
  - Tip orifice & angle
- Spray Height
- Operating Speed

## 3. Weather

- Wind Direction
- Air Flow or Wind Speed
- Air Stability
- Temperature and Humidity (drop size)



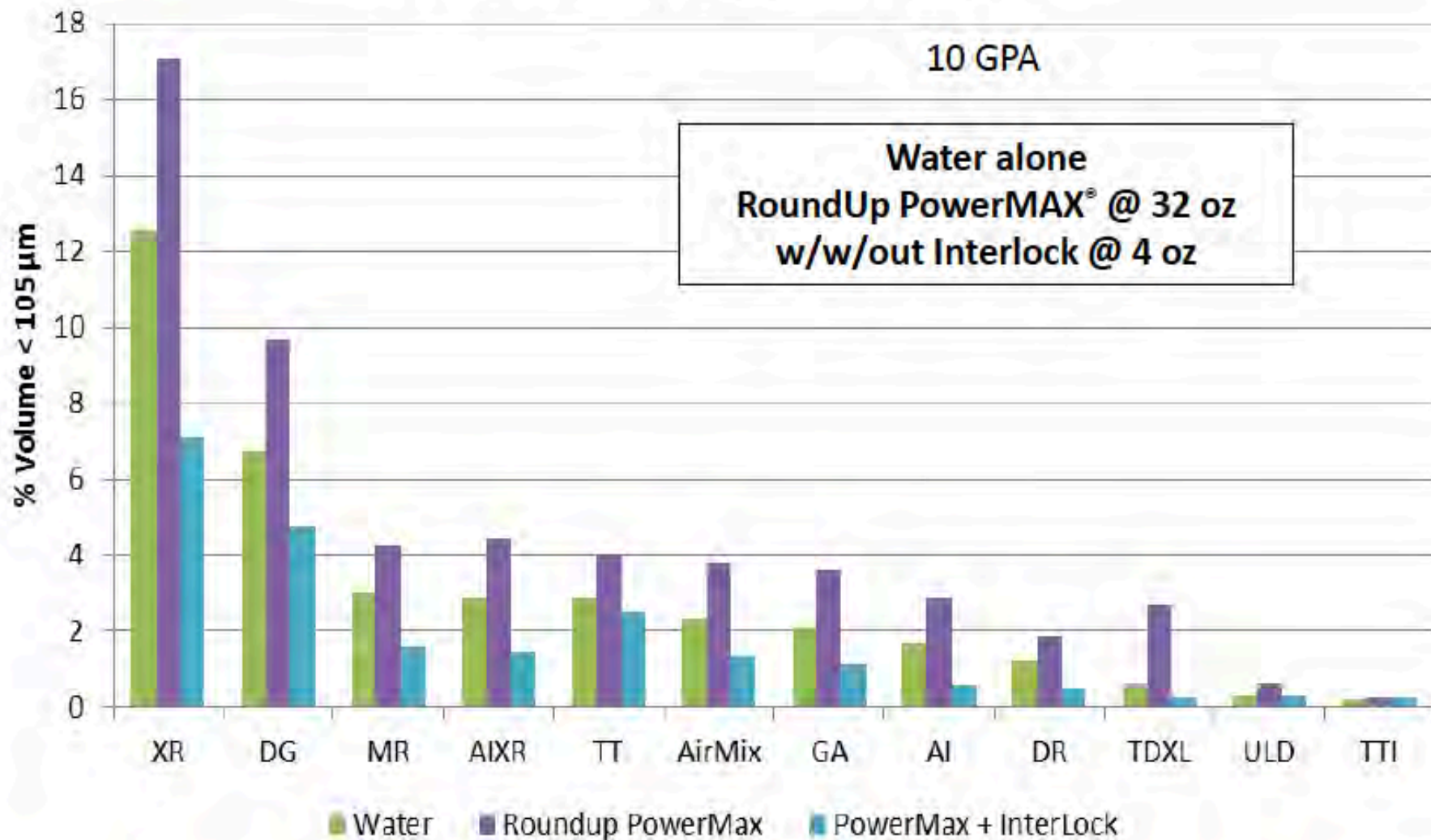
**What Inspectors Need to Ascertain!**



# Spray Solution Changes Droplet Sizes

- Formulation
- Spray Adjuvants
  - Spreaders, wetting agents
  - Deposition aids
- Tank Mixes

# Volume % Driftable Fines 110°/120° - 04 Nozzles @ 40 psi



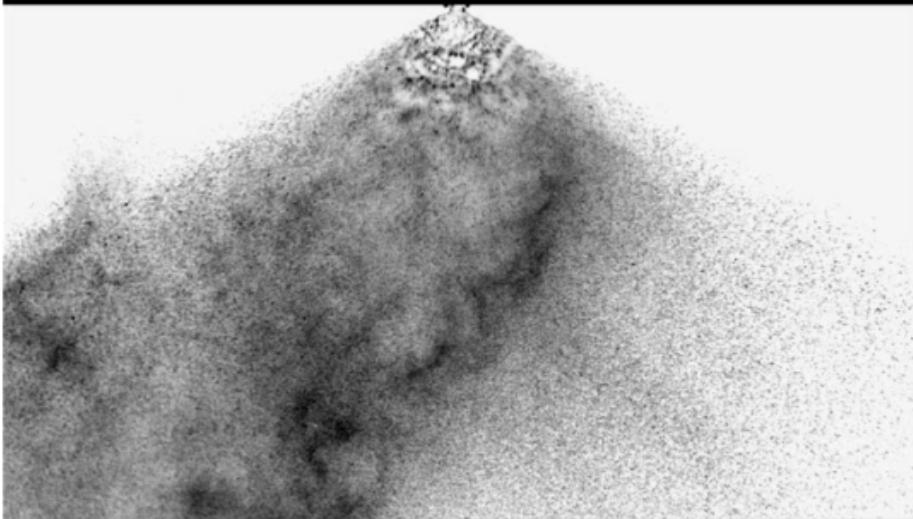


# Spray Adjuvants

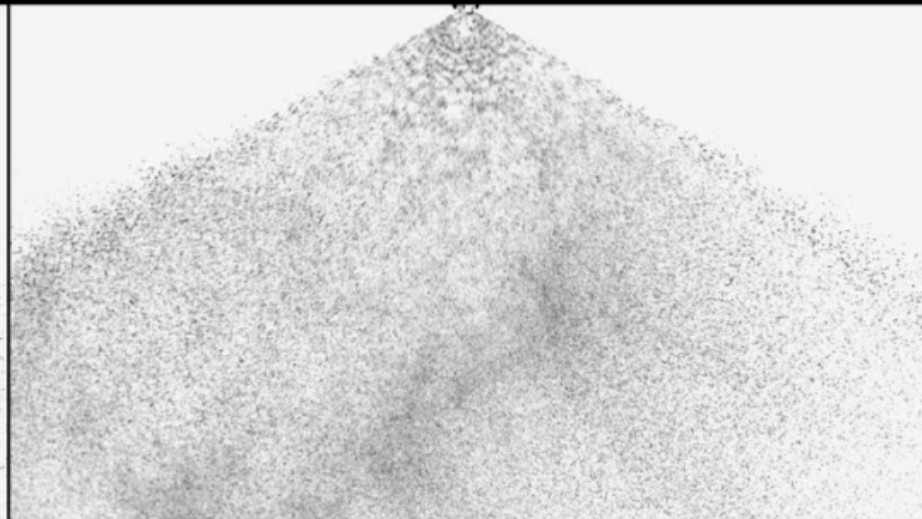
Some adjuvants hold droplets together, others breakup more easily!

## Spray Comparison Wind - XR TeeJet<sup>®</sup>

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Herbicide Alone

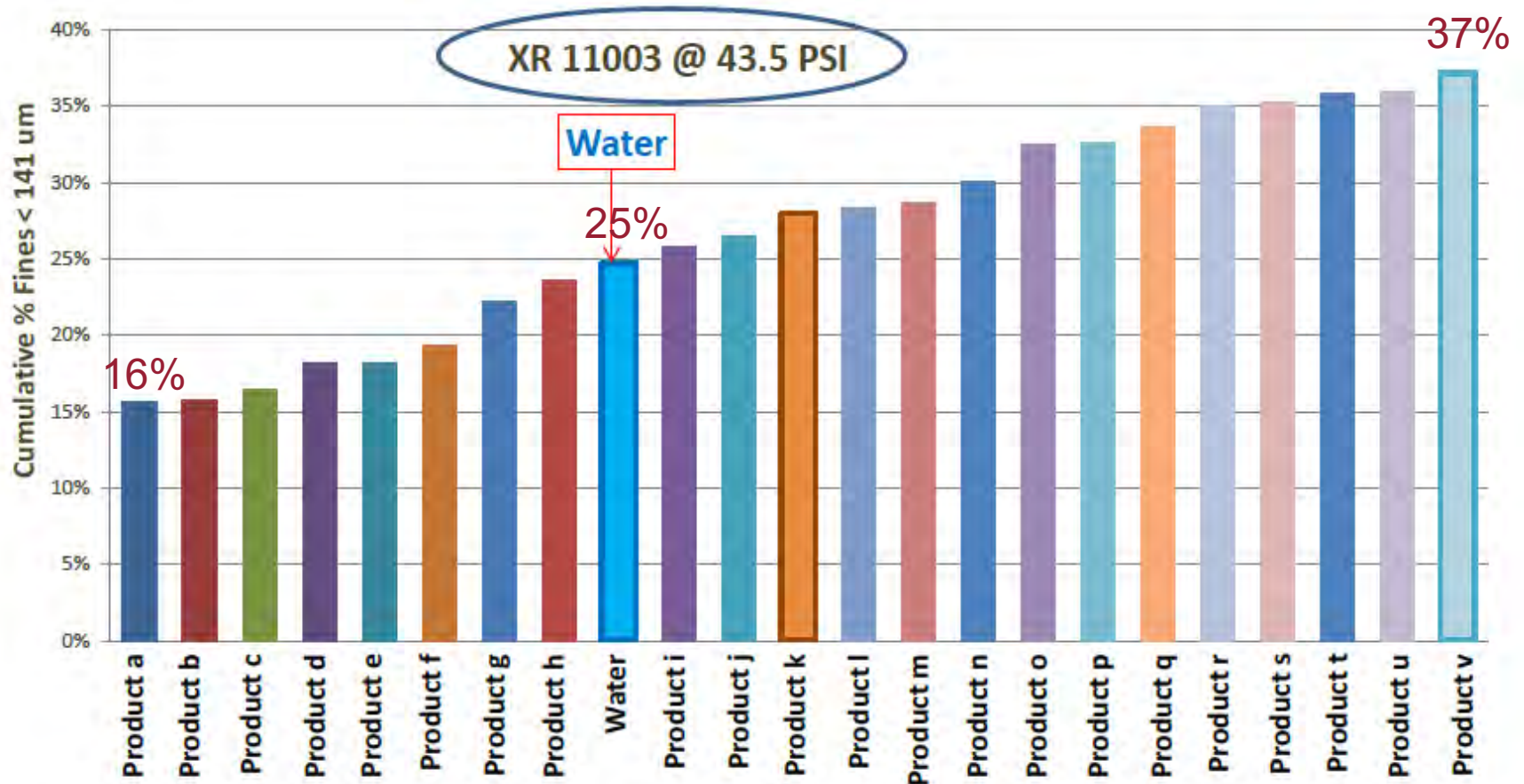


Herbicide + InterLock<sup>®</sup>





# Tank Mix Influences Droplet Size



Without drift reducing adjuvants--other adjuvants indicated by 'mix'



## Other Important Droplet Issues

### Relative Span (RS)

- $RS = (Dv0.9 - Dv0.1) / VMD$
- $Dv0.9 = 400$ ,  $VMD = 300$ ,  $Dv0.1 = 100$ 
  - Relative span = 1
- $Dv0.9 = 650$ ,  $VMD = 300$ ,  $Dv0.1 = 50$ 
  - Relative span = 2
- The narrower the RS, the greater precision



# Why Use Different Spray Qualities

<b>Spray Quality Categories</b>	
<b>ASABE Standard S-572.1</b>	
<b>Category (symbol)</b>	<b>Color Code</b>
Extra Fine (XF)	Purple
Very Fine (VF)	Red
Fine (F)	Orange
Medium (M)	Yellow
Coarse (C)	Blue
Very Coarse (VC)	Green
Extra Coarse (XC)	White
Ultra Coarse (UC)	Black

Fungicides/Insecticides







Contact Herbicides

Systemic Herbicides











# Why Use Different Spray Qualities

## Broadcast Nozzle Selection Guide

		HERBICIDES		FUNGICIDES		INSECTICIDES		DRIFT MANAGEMENT	PWM NOZZLE CONTROL	
	SOIL APPLIED	POST-EMERGENCE		CONTACT	SYSTEMIC	CONTACT	SYSTEMIC			
		CONTACT	SYSTEMIC							
	<b>Air Induction Turbo TwinJet<sup>®</sup></b> Reference page 17	VERY GOOD	GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD	EXCELLENT		
	<b>AI3070<sup>®</sup></b> Reference page 18		VERY GOOD	VERY GOOD	EXCELLENT	VERY GOOD	EXCELLENT	VERY GOOD	EXCELLENT	
	<b>XR, XRC TeeJet<sup>®</sup></b> Reference pages 12-13		EXCELLENT	GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD	GOOD	EXCELLENT
	<b>XR, XRC TeeJet<sup>®</sup></b> at pressures below 30 PSI (2.0 bar) Reference pages 12-13	GOOD	GOOD	VERY GOOD	GOOD	VERY GOOD	GOOD	VERY GOOD	VERY GOOD	EXCELLENT
	<b>AI XR TeeJet<sup>®</sup></b> Reference page 8	VERY GOOD	GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD	EXCELLENT	EXCELLENT	
	<b>AI, AIC TeeJet<sup>®</sup></b> Reference pages 9-10	VERY GOOD	GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD	EXCELLENT	EXCELLENT	

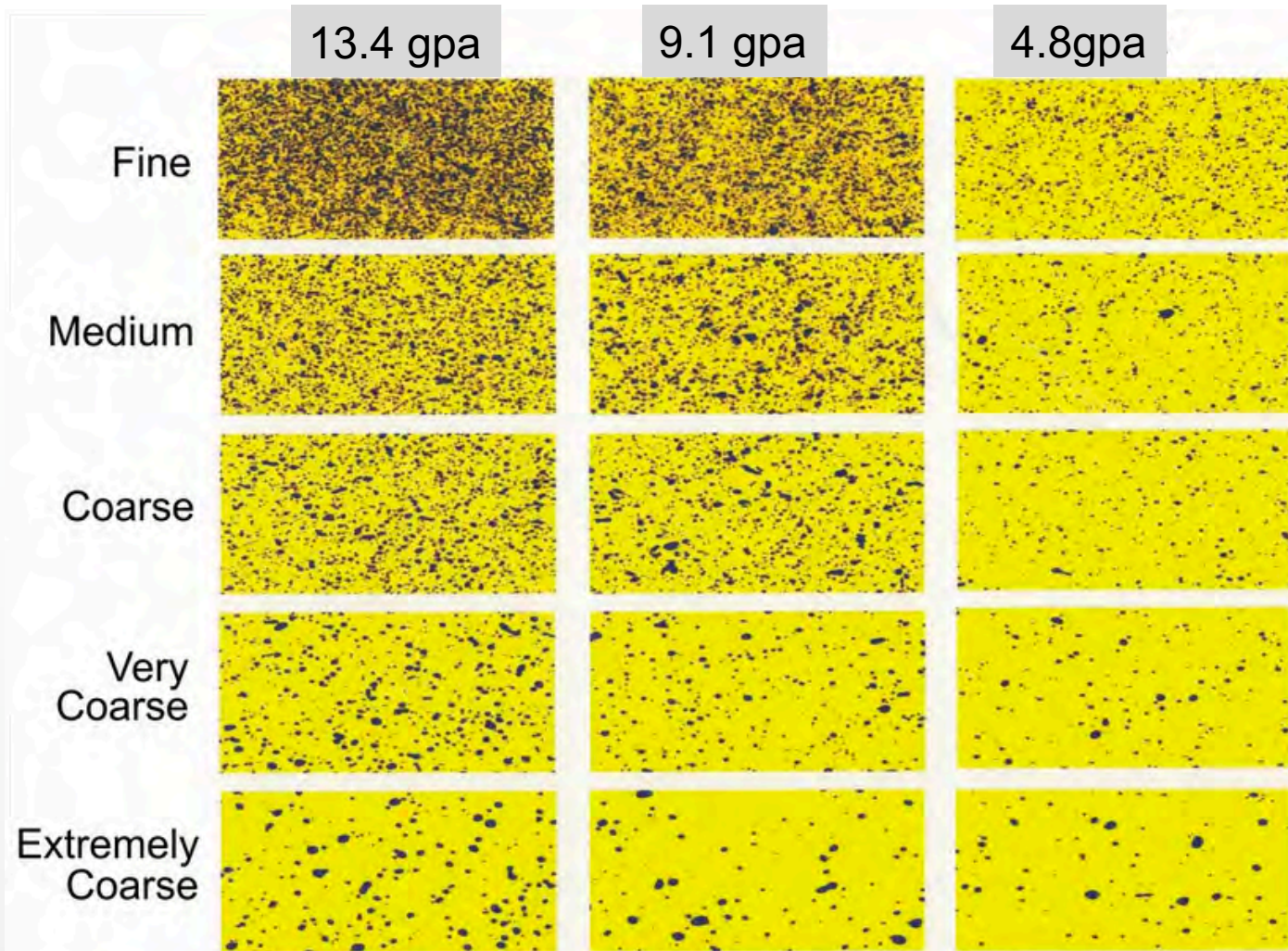


# Specialty Nozzle Selection Guide

		HERBICIDES		FUNGICIDES		INSECTICIDES		
		SOIL APPLIED	POST-EMERGENCE		CONTACT	SYSTEMIC	CONTACT	SYSTEMIC
			CONTACT	SYSTEMIC				
DIRECTED SPRAYING	 <b>AI TeeJet<sup>EVEN</sup></b> Reference page 33	VERY GOOD	GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD	EXCELLENT
	 <b>TeeJet<sup>EVEN</sup></b> Reference page 35	GOOD	GOOD	GOOD	GOOD	GOOD	GOOD	GOOD
	 <b>TwinJet<sup>EVEN</sup></b> Reference page 36		VERY GOOD		VERY GOOD		VERY GOOD	
	 <b>AIUB TeeJet</b> Reference page 37		GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD	EXCELLENT
	 <b>AITX ConeJet<sup>+</sup></b> Reference page 43		GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD	EXCELLENT
	 <b>ConeJet<sup>+</sup></b> Reference pages 32 & 39		EXCELLENT		EXCELLENT		EXCELLENT	
AIR BLAST	 <b>ConeJet<sup>+</sup></b> Reference pages 40–43		EXCELLENT	GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD
	 <b>Disc-Core</b> Reference pages 45–46		EXCELLENT	GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD



# Coverage and Droplet Size



Sprayers101

These water-sensitive papers were sprayed under controlled conditions and they demonstrate the role droplet size plays in coverage. As the droplets get finer, there are more of them, increasing coverage. However, this is really only hypothetical as many drift off target before impinging. As the droplets get coarser, there are less of them, and coverage may be compromised. To compensate for this, higher volumes are used. Credit – Dr. T. Wolf, Saskatchewan.



# Driftable Droplets\*



NOZZLE TYPE (0.50 GPM FLOW)	APPROXIMATE PERCENT OF SPRAY VOLUME LESS THAN 150 MICRONS	
	15 PSI	40 PSI
XR – Extended Range TeeJet (110°)	19%	30%
TT – Turbo TeeJet (110°)	4%	13%
TTJ60 – Turbo TwinJet (110°)	3%	10%
TF – Turbo FloodJet	2%	7%
AIXR – Air Induction XR (110°)	2%	7%
AITTJ60 – Air Induction Turbo TwinJet (110°)	1%	6%
AI – Air Induction TeeJet (110°)	N/A	5%
TTI – Turbo TeeJet Induction (110°)	<1%	2%

\*Data obtained from Oxford VisiSizer system spraying water at 70°F (21°C) under laboratory conditions.



# The Old Guard – XR TeeJet – Extended Range



XR 8001

	PSI	DROP SIZE	
		80°	110°
		 	
XR8001 XR11001 (100)	15	F	F
	20	F	F
	30	F	F
	40	F	F
	50	F	F
XR80015 XR110015 (100)	15	M	F
	20	F	F
	30	F	F
	40	F	F
	50	F	F
XR8002 XR11002 (50)	15	M	M
	20	M	F
	30	F	F
	40	F	F
	50	F	F
XR80025 XR110025 (50)	15	M	M
	20	M	M
	30	F	F
	40	F	F
	50	F	F
XR8003 XR11003 (50)	15	M	M
	20	M	M
	30	F	F
	40	F	F
	50	F	F
XR80035 (50)	15	M	
	20	M	
	30	M	
	40	M	
	50	F	

XR 80015

XR 8003

XR 8004

	PSI	DROP SIZE	
		80°	110°
		 	
XR8004 XR11004 (50)	15	C	M
	20	M	M
	30	M	M
	40	M	M
	50	F	F
XR8005 XR11005 (50)	15	C	M
	20	C	M
	30	M	M
	40	M	M
	50	M	F
XR8006 XR11006 (50)	15	C	C
	20	C	M
	30	M	M
	40	M	M
	50	M	M
XR8008 XR11008 (50)	15	VC	C
	20	VC	C
	30	C	C
	40	M	M
	50	M	M
XR8010 <sup>†</sup> XR11010 <sup>†</sup>	15	XC	VC
	20	VC	C
	30	C	C
	40	C	M
	50	C	M
XR8015 <sup>†</sup> XR11015 <sup>†</sup>	15	XC	VC
	20	XC	VC
	30	VC	VC
	40	VC	C
	50	C	C

XR 8008

## XR TeeJet® (XR)

	PSI						
	15	20	25	30	40	50	60
XR8001	F	F	F	F	F	F	F
XR80015	M	F	F	F	F	F	F
XR8002	M	M	F	F	F	F	F
XR80025	M	M	F	F	F	F	F
XR8003	M	M	M	F	F	F	F
XR80035	M	M	M	M	M	F	F
XR8004	C	M	M	M	M	F	F
XR8005	C	C	M	M	M	M	F
XR8006	C	C	C	M	M	M	M
XR8008	VC	VC	C	C	M	M	M
XR8010	XC	VC	VC	C	C	C	C
XR8015	XC	XC	VC	VC	VC	C	C
XR11001	F	F	F	F	F	F	VF
XR110015	F	F	F	F	F	F	F
XR11002	M	F	F	F	F	F	F
XR110025	M	M	F	F	F	F	F
XR11003	M	M	M	F	F	F	F
XR11004	M	M	M	M	M	F	F
XR11005	M	M	M	M	M	F	F
XR11006	C	M	M	M	M	M	F
XR11008	C	C	C	C	M	M	M
XR11010	VC	C	C	C	M	M	M
XR11015	VC	VC	VC	VC	C	C	C





# AIXR Teejet



Icon	PSI	DROP SIZE	CAPACITY ONE NOZZLE IN GPM	CAPACITY ONE NOZZLE IN OZ./MIN.	GPA					
					20					
					4 MPH	5 MPH	6 MPH	8 MPH	10 MPH	12 MPH
<b>AIXR110015</b> (100)	15	XC	0.092	12	6.8	5.5	4.6	3.4	2.7	2.3
	20	XC	0.11	14	8.2	6.5	5.4	4.1	3.3	2.7
	30	C	0.13	17	9.7	7.7	6.4	4.8	3.9	3.2
	40	C	0.15	19	11.1	8.9	7.4	5.6	4.5	3.7
	50	C	0.17	22	12.6	10.1	8.4	6.3	5.0	4.2
	60	M	0.18	23	13.4	10.7	8.9	6.7	5.3	4.5
	75	M	0.21	27	15.6	12.5	10.4	7.8	6.2	5.2
90	M	0.23	29	17.1	13.7	11.4	8.5	6.8	5.7	
<b>AIXR11002</b> (50)	15	XC	0.12	15	8.9	7.1	5.9	4.5	3.6	3.0
	20	XC	0.14	18	10.4	8.3	6.9	5.2	4.2	3.5
	30	VC	0.17	22	12.6	10.1	8.4	6.3	5.0	4.2
	40	C	0.20	26	14.9	11.9	9.9	7.4	5.9	5.0
	50	C	0.22	28	16.3	13.1	10.9	8.2	6.5	5.4
	60	C	0.24	31	17.8	14.3	11.9	8.9	7.1	5.9
	75	M	0.27	35	20	16.0	13.4	10.0	8.0	6.7
90	M	0.30	38	22	17.8	14.9	11.1	8.9	7.4	
<b>AIXR110025</b> (50)	15	XC	0.15	19	11.1	8.9	7.4	5.6	4.5	3.7
	20	XC	0.18	23	13.4	10.7	8.9	6.7	5.3	4.5
	30	XC	0.22	28	16.3	13.1	10.9	8.2	6.5	5.4
	40	VC	0.25	32	18.6	14.9	12.4	9.3	7.4	6.2
	50	C	0.28	36	21	16.6	13.9	10.4	8.3	6.9
	60	C	0.31	40	23	18.4	15.3	11.5	9.2	7.7
	75	C	0.34	44	25	20	16.8	12.6	10.1	8.4
90	C	0.38	49	28	23	18.8	14.1	11.3	9.4	

# DG Teejet



Icon	PSI	DROP SIZE		CAPACITY ONE NOZZLE IN GPM	CAPACITY ONE NOZZLE IN OZ./MIN.	GP			
		80°	110°			8 MPH			
		4 MPH	5 MPH			6 MPH	8 MPH		
<b>DG80015†</b> <b>DG110015</b> (100)	30	M	M	0.13	17	9.7	7.7	6.4	4.8
	35	M	M	0.14	18	10.4	8.3	6.9	5.2
	40	M	F	0.15	19	11.1	8.9	7.4	5.6
	50	M	F	0.17	22	12.6	10.1	8.4	6.3
	60	F	F	0.18	23	13.4	10.7	8.9	6.7
<b>DG8002†</b> <b>DG11002</b> (50)	30	M	M	0.17	22	12.6	10.1	8.4	6.3
	35	M	M	0.19	24	14.1	11.3	9.4	7.1
	40	M	M	0.20	26	14.9	11.9	9.9	7.4
	50	M	M	0.22	28	16.3	13.1	10.9	8.2
	60	M	M	0.24	31	17.8	14.3	11.9	8.9
<b>DG8003†</b> <b>DG11003</b> (50)	30	C	C	0.26	33	19.3	15.4	12.9	9.7
	35	M	M	0.28	36	21	16.6	13.9	10.4
	40	M	M	0.30	38	22	17.8	14.9	11.1
	50	M	M	0.34	44	25	20	16.8	12.6
60	M	M	0.37	47	27	22	18.3	13.7	

80 or 110



# Orchard and Vineyard – Conejets



	PSI	DROP SIZE	CAP T NO IN
TXA800050VK TXB800050VK (100)	40	VF	(
	60	VF	(
	80	VF	(
	100	VF	(
TXA800067VK TXB800067VK (50)	40	VF	(
	60	VF	(
	80	VF	(
	100	VF	(
TXA8001VK TXB8001VK (50)	40	F	(
	60	VF	(
	80	VF	(
	100	VF	(
TXA80015VK TXB80015VK (50)	40	F	(
	60	F	(
	80	VF	(
	100	VF	(
TXA8002VK TXB8002VK (50)	40	F	(
	60	F	(
	80	VF	(
	100	VF	(
TXA8003VK TXB8003VK (50)	40	F	(
	60	F	(
	80	F	(
	100	VF	(
TXA8004VK TXB8004VK (50)	40	F	(
	60	F	(
	80	F	(
	100	VF	(
125	VF	(	

		GPM									
		30 PSI	40 PSI	50 PSI	60 PSI	70 PSI	80 PSI	90 PSI	100 PSI	120 PSI	140 PSI
TX-VS1	100	0.015	0.017	0.018	0.020	0.021	0.022	0.023	0.024	0.026	0.028
		VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX-VS2	100	0.029	0.033	0.037	0.040	0.043	0.045	0.047	0.050	0.054	0.058
		VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX-VK3	100	0.044	0.050	0.055	0.060	0.064	0.068	0.071	0.075	0.081	0.086
		F	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX-VK4	50	0.058	0.067	0.074	0.080	0.086	0.091	0.096	0.101	0.110	0.118
		F	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX-VK6	50	0.088	0.100	0.111	0.120	0.129	0.137	0.145	0.152	0.165	0.177
		F	F	VF	VF	VF	VF	VF	VF	VF	VF
TX-VK8	50	0.116	0.133	0.148	0.162	0.174	0.186	0.196	0.207	0.225	0.243
		F	F	VF	VF	VF	VF	VF	VF	VF	VF
TX-VK10	50	0.145	0.167	0.185	0.202	0.218	0.232	0.246	0.258	0.282	0.303
		F	F	F	F	VF	VF	VF	VF	VF	VF
TX-VK12	50	0.174	0.200	0.223	0.243	0.261	0.279	0.295	0.310	0.338	0.364
		F	F	F	F	VF	VF	VF	VF	VF	VF
TX-VK18	50	0.260	0.300	0.335	0.367	0.396	0.423	0.449	0.473	0.517	0.558
		F	F	F	F	F	F	VF	VF	VF	VF
TX-VK26	50	0.376	0.433	0.484	0.530	0.572	0.611	0.648	0.683	0.747	0.807
		F	F	F	F	F	F	VF	VF	VF	VF





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Nozzle product guide





## ASABE S572.1 Droplet Size Classification

The American Society of Agricultural and Biological Engineers (ASABE) developed the ASABE S572.1 standard to measure and interpret spray quality from tips.

Spray Quality*	Size of Droplets	VMD Range (Microns)**	Color Code	Retention on Difficult to Wet Leaves	Used For	Drift Potential
Extremely Fine	Small	<50	Purple	Excellent	Exceptions	High
Very Fine	↓	51-100	Red	Excellent	Exceptions	↓
Fine		100-235	Orange	Very Good	Good Cover	
Medium		236-340	Yellow	Good	Most Products	
Coarse	↓	341-403	Blue	Moderate	Systemic Herbicides	↓
Very Coarse	404-502	Green	Poor	Soil Herbicides		
Extremely Coarse	503-665	White	Very Poor	Liquid Fertilizer		
Ultra Coarse	Large	>665	Black	Very Poor	Liquid Fertilizer	Low

\*Always read the pesticide label to determine which spray quality is required.

\*\*Estimated from sample reference graph in ASABE/ANSI/ASAE Standard S572.1

ASABE S572.1 standard uses eight droplet classification categories, six of which are common for agriculture and horticulture:



Most agrochemical applications recommend a fine, medium, or coarse spray:



sprays provide enhanced retention for directed spraying on the target including:

- Foliar-acting weed control
- Contact-acting fungicides and insecticides



sprays are the most widely used spray type.

- Used by default by most applications when spray quality is not defined by the label
- Systemic-acting fungicides, insecticides and herbicides.



sprays are used with systemic, residual, and soil-applied herbicides.



Approximate Description	Droplet Size (Microns)	Common Item Compared To (Approximate)
Fog	Up to 25	Point of a Needle (25 Microns)
Fine Mist	25-100	Human Hair (100 Microns)
Fine Drizzle	100-250	Sewing Thread (150 Microns)
Heavy Drizzle	250-500	Toothbrush Bristle (300 Microns)
Light Rain	500-800	Staple (500 Microns)
Heavy Rain	800-1000	Paper Clip (800 Microns)
Thunderstorm Rain	1000-4000	#2 Pencil Lead (2000 Microns)

Droplet sizes are usually measured in microns.

- Generally, they range from 10 to 1000 microns.
- Fog is the smallest droplet size, followed by mist, drizzle, rain, and heavy rain.
- The larger the droplet size, the more likely it is to be retained on the target.
- The smaller the droplet size, the more likely it is to be retained on the target.
- The smaller the droplet size, the more likely it is to be retained on the target.
- The smaller the droplet size, the more likely it is to be retained on the target.

PREP Archive

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## **Acknowledgement**

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## **Disclaimer**

- Brand names appearing in this presentation are for education and illustration purposes only.
- No endorsement is intended, nor is criticism implied of similar products not mentioned.



Thank You