WASHINGTON STATE UNIVERSITY
EXTENSION

Pesticide Application to Minimize Drift

and

Communicating about Herbicides

Carol Black

Washington State University

How Herbicides Can Move Off Target

- Spray droplets drift
- Volatile formulations
- Dust with residues
- Run off from treated soils
- Leaching in soils

Herbicide Drift ->

- **Spray droplets drift**
  - % fines suspended in air, drop size
- **Volatile formulations**
  - Dicamba, low-volatile ester 2,4-D
- **Dust with residues**
  - Soil applied residual herbicides before they become incorporated into the soil

Critical Factors Influencing Spray Drift

- Weather
  - Temperature
  - Humidity
  - Temperature inversion
- Spray Quality – drop size

Applicator decides what product to use, what formulation, equipment set up (nozzles, height), assesses weather,
to spray or not to spray

<u>*Spray drift*</u> is droplets moving off target in air

* **moves up and away – dissipates**
* **hangs, suspends, moves in concentrated mass**

How far depends on how many hours suspended

How much depends on amount applied

Eastern Washington Herbicide Rules

WAC 16-230-640

Use restricted herbicides—Eastern Washington —Weather and temperature conditions.

Use restricted herbicides shall not be applied on and after April 1 through October 31 of each year when there is a temperature inversion; or throughout the year if weather conditions are such that damage could result to adjacent and nearby towns, susceptible crops and plantings through physical drift or volatilization, or the temperature is 85°F. or above at the point of application: Provided, That application at the rate of fifty

Herbicide label requirements for weather: inversions, wind speed

"Temperature Inversions

If applying at **wind speeds less than 3 mph**, the applicator must determine if:

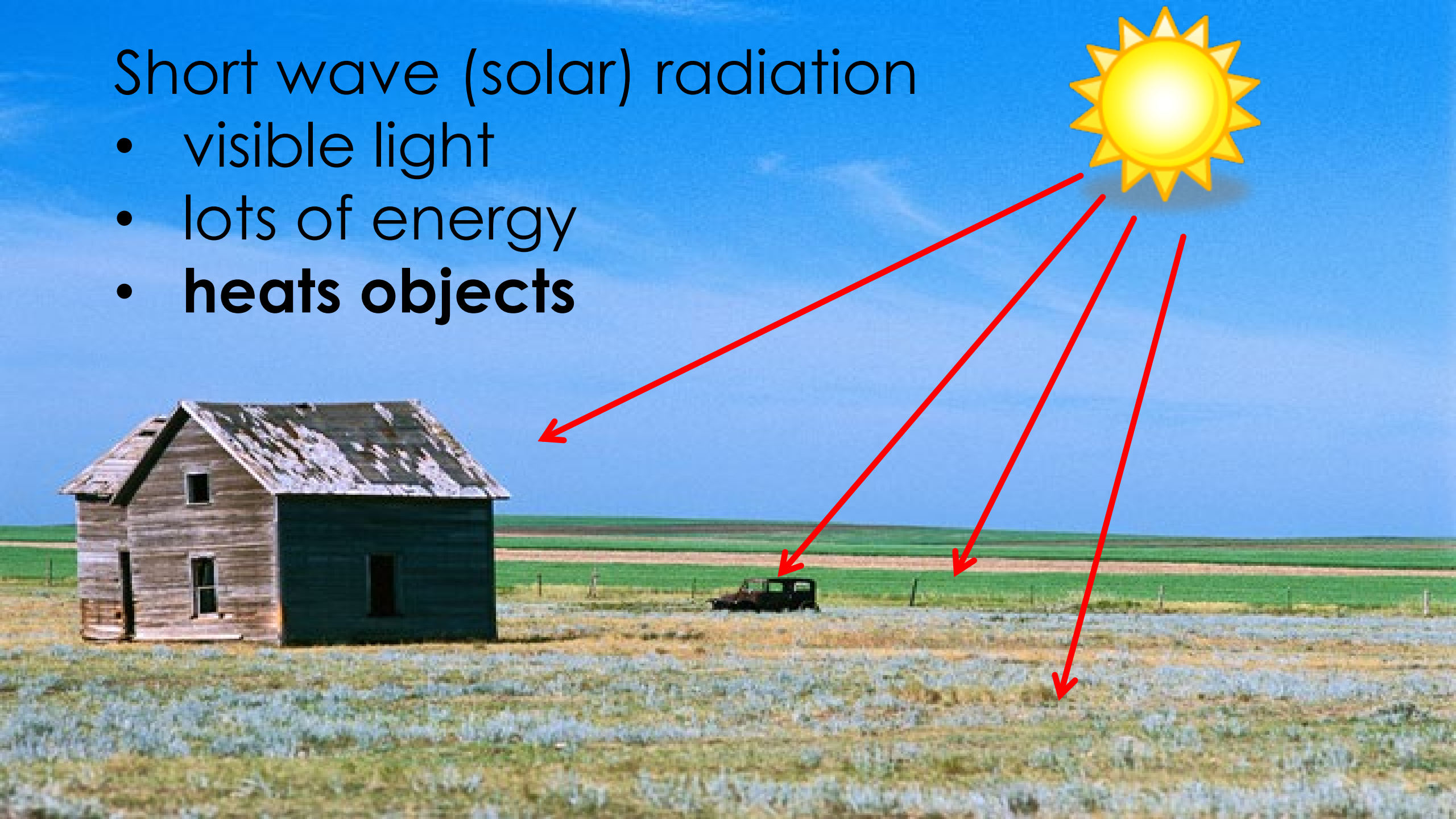
a) conditions of temperature inversion exist, or
b) stable atmospheric conditions exist at or below nozzle height.

Do not make applications into areas of temperature inversions or stable atmospheric conditions."

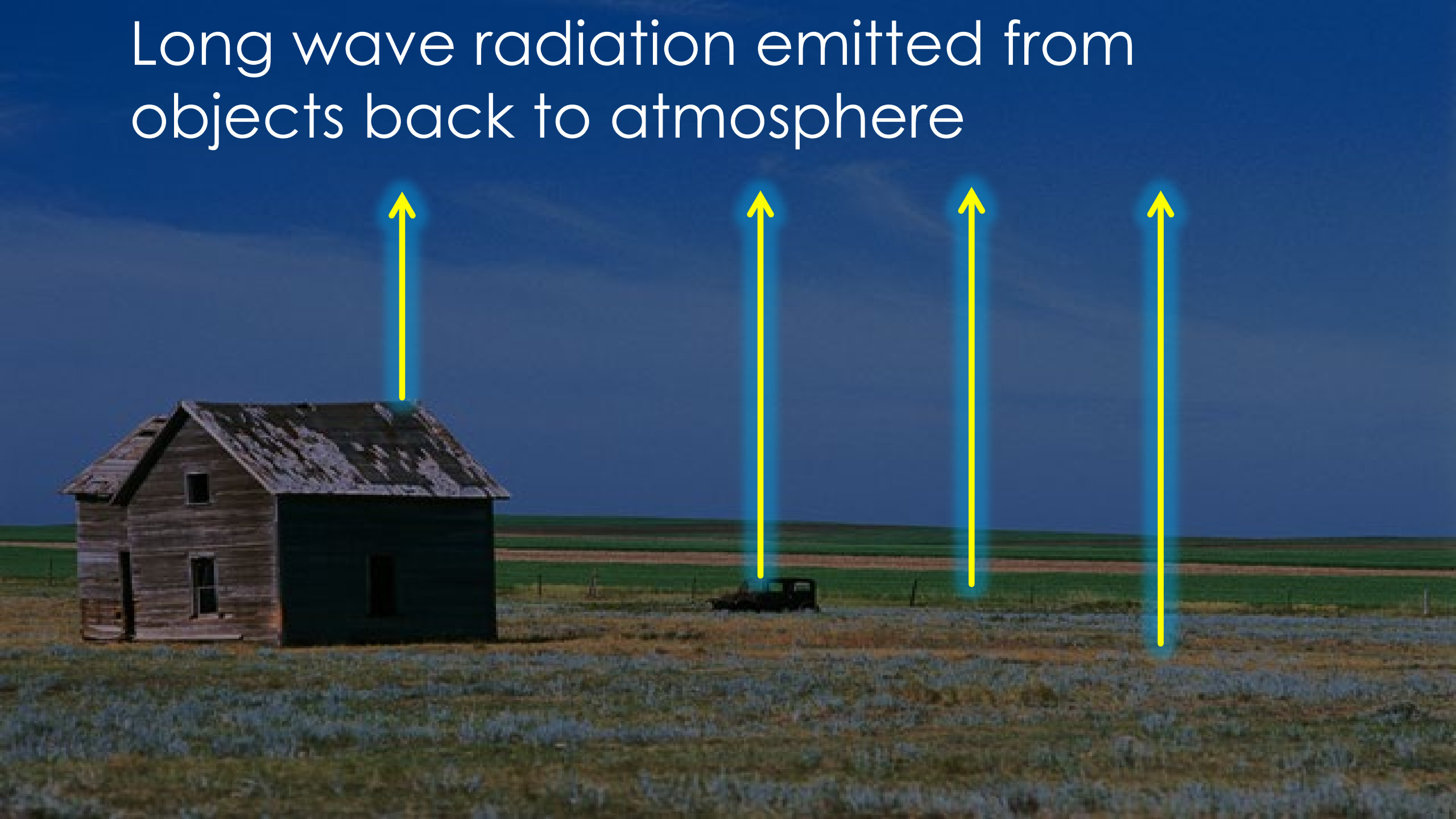
Let's back up and explain this rather than assuming that you all have a degree in meteorology!

Short wave (solar) radiation

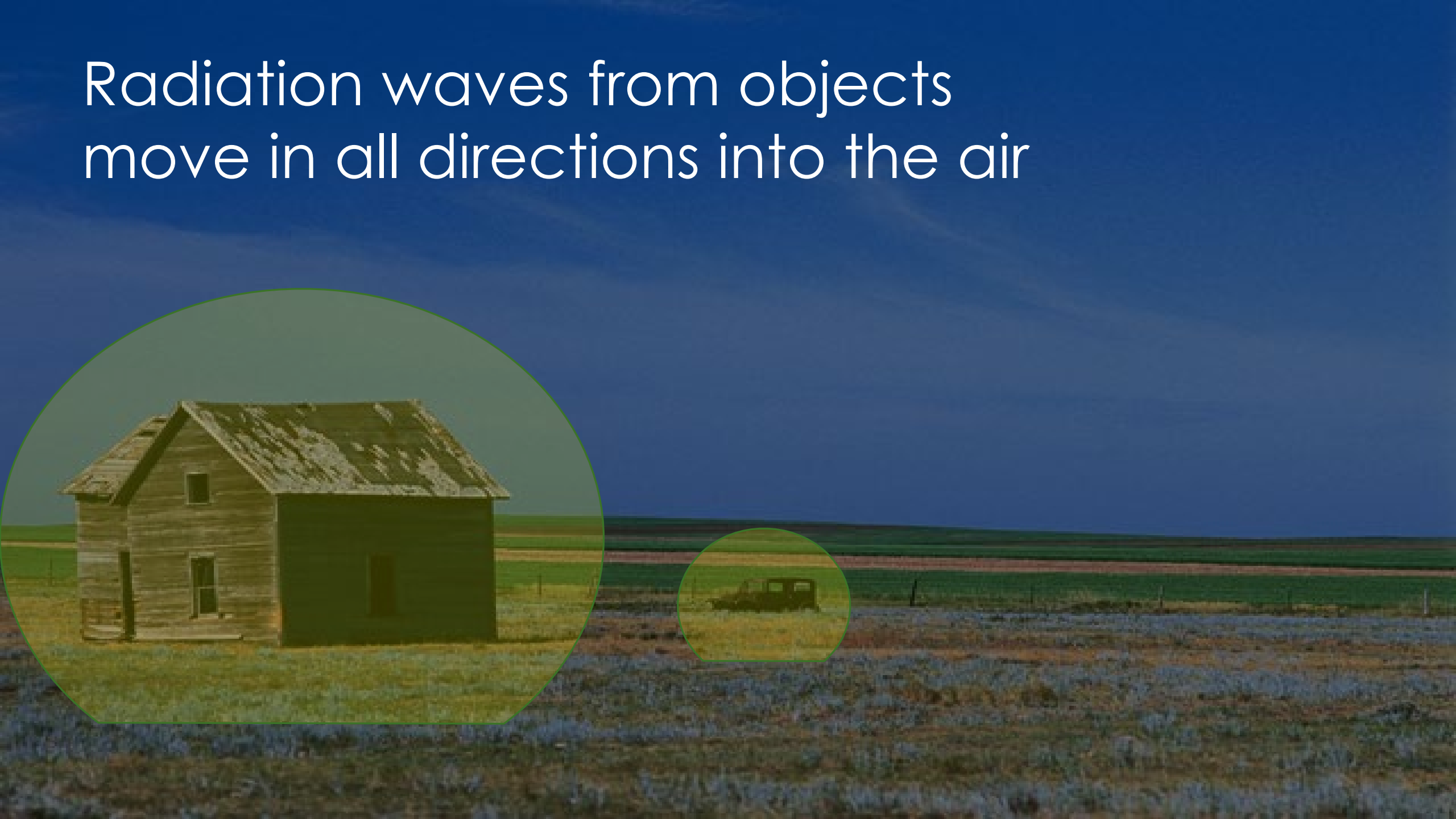
- visible light
- lots of energy
- **heats objects**



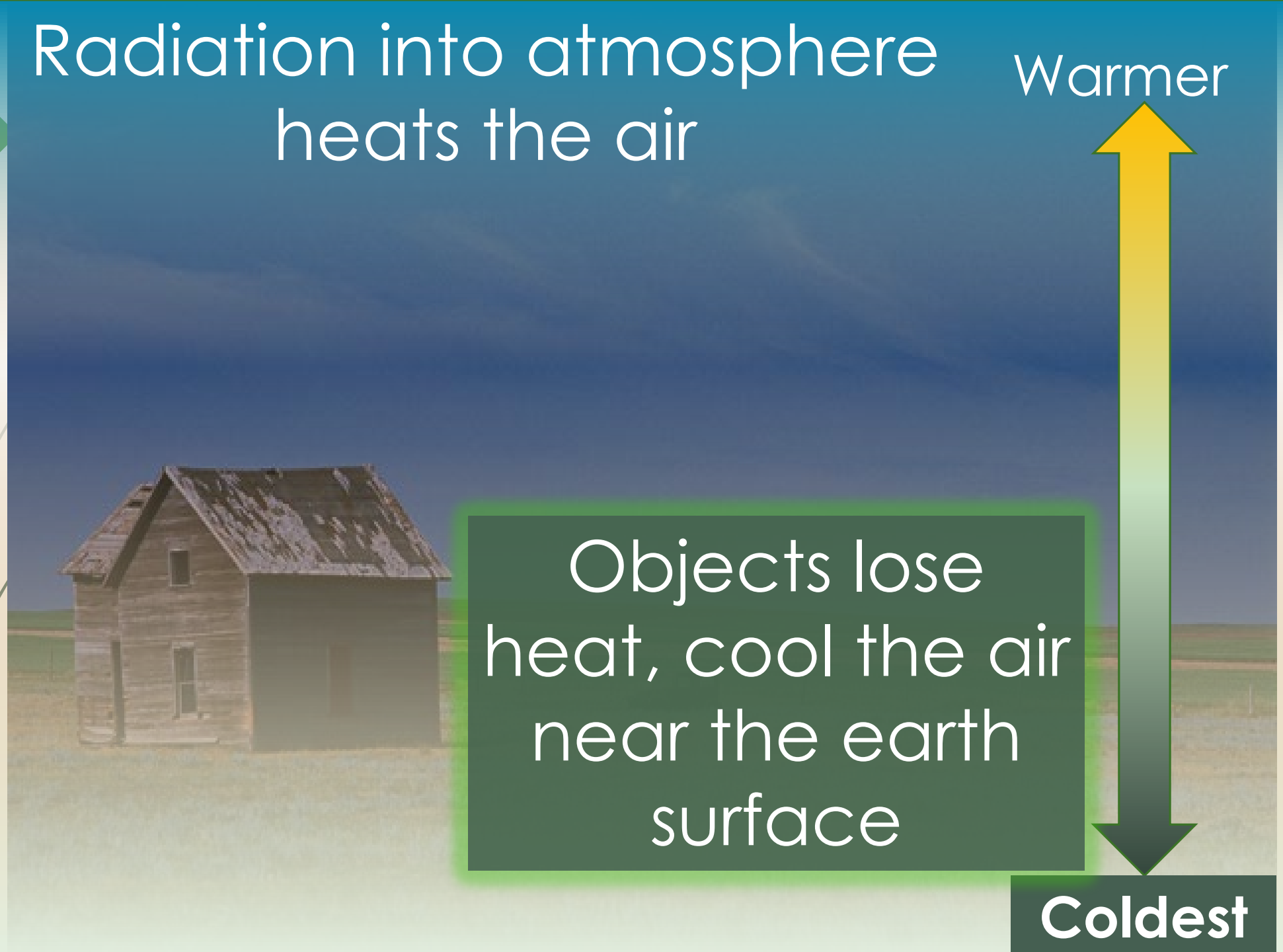
Long wave radiation emitted from objects back to atmosphere



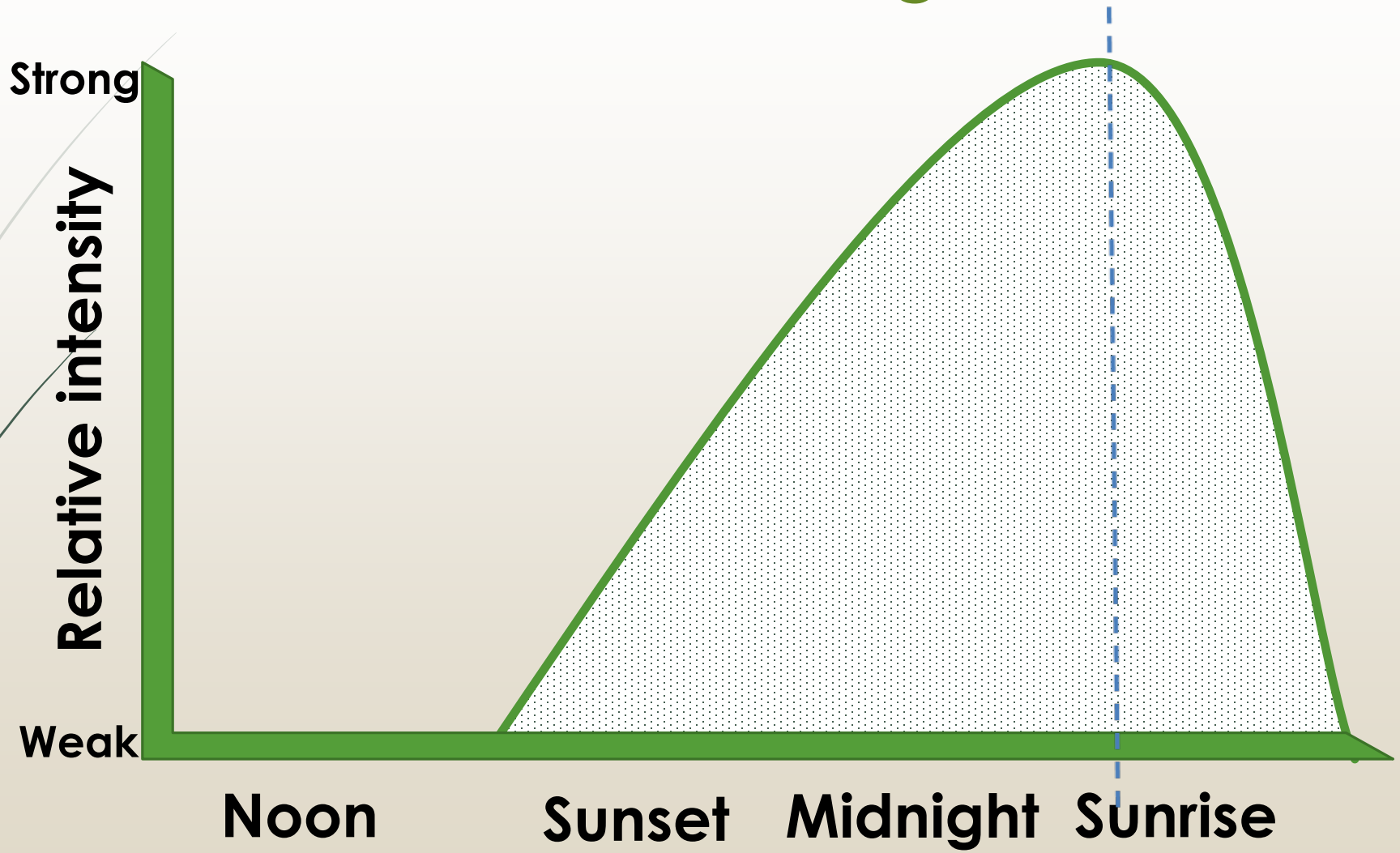
Radiation waves from objects move in all directions into the air



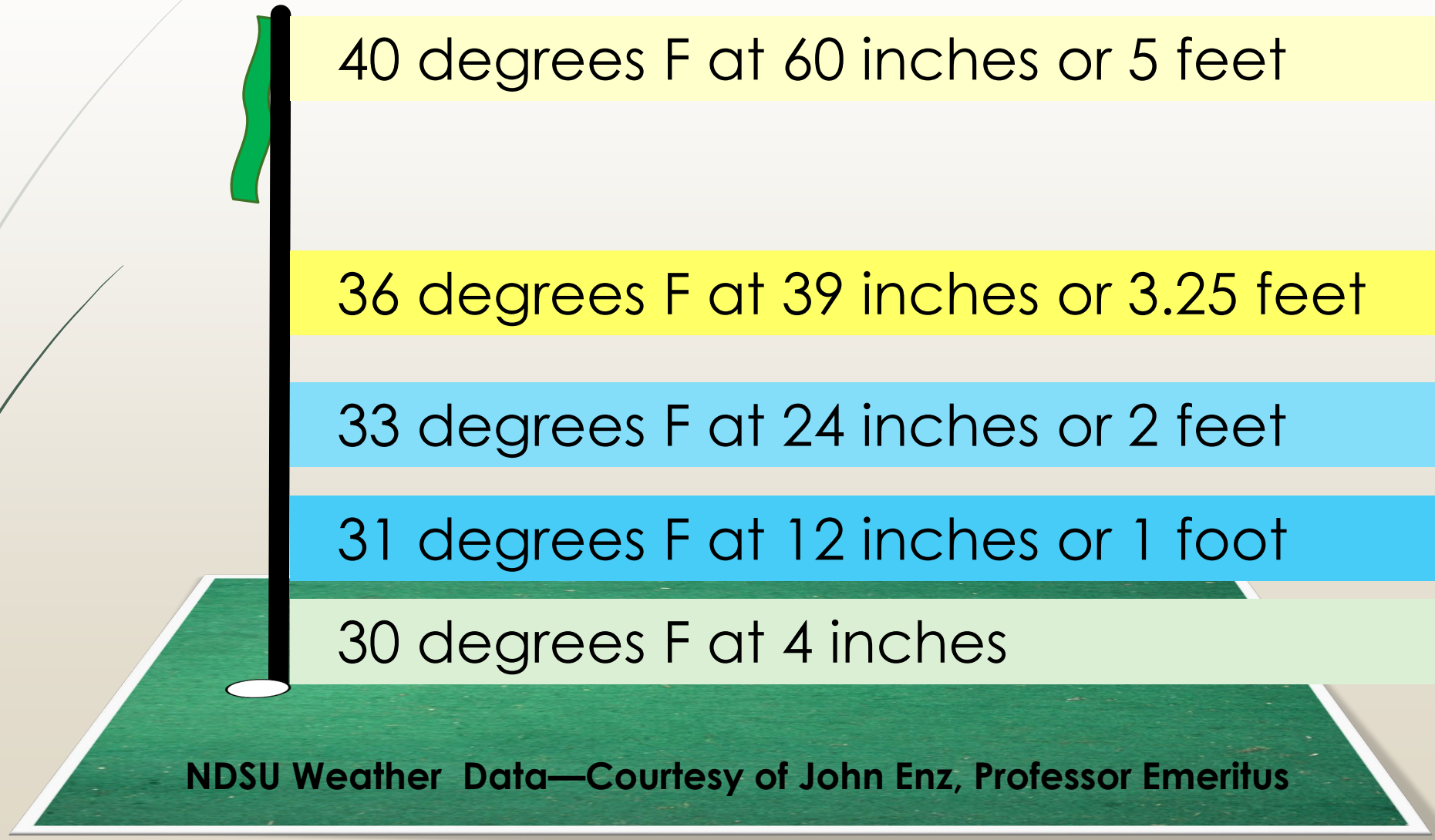
Radiation into atmosphere heats the air



On a clear & calm 24 hour day, when will inversions begin and end?



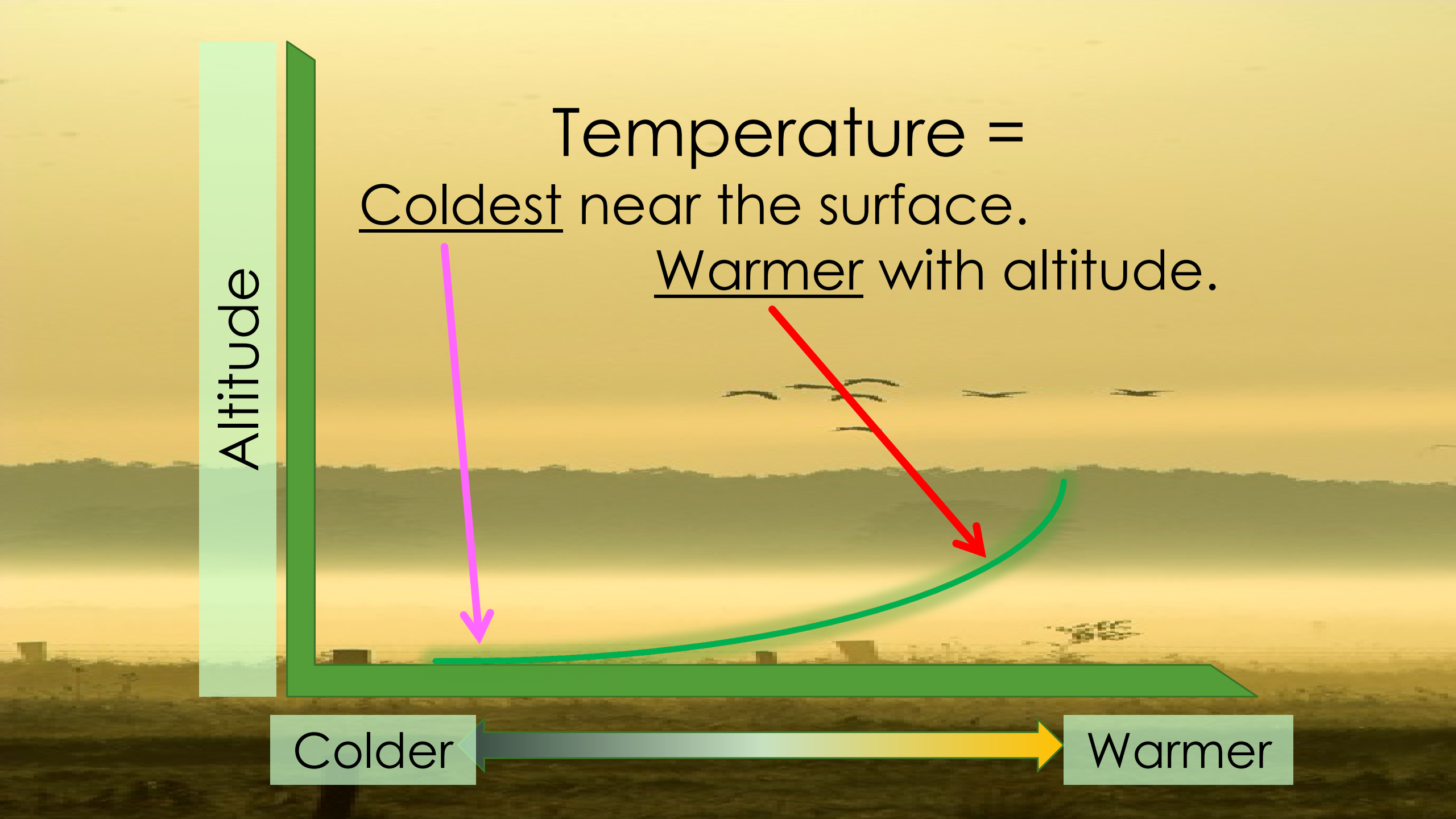
Typical early morning temperature profile with a strong inversion (calm & clear)



If there is sufficient moisture in the air, dew and frost will form because of cool air near the ground.

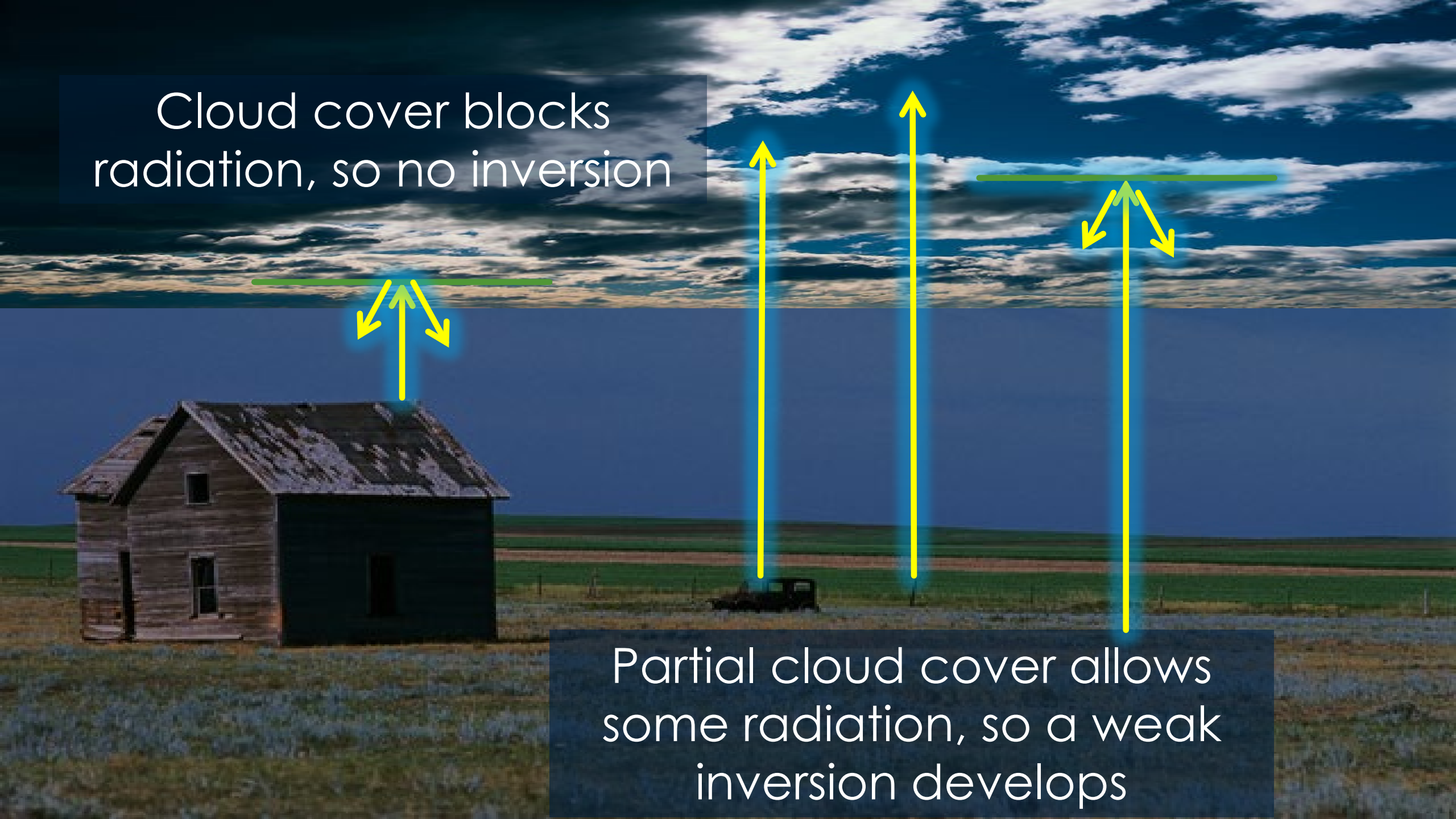

If there is sufficient moisture in the air, fog will also form.


If the light and fog reflect just so, one can actually see the inversion.
Warm air
Cold air


Temperature =
Coldest near the surface.
Warmer with altitude.
Altitude
Colder
Warmer

All the conditions we've talked about assumes very little wind.

Sufficient wind will mix the air, thus preventing or destroying the inversion.

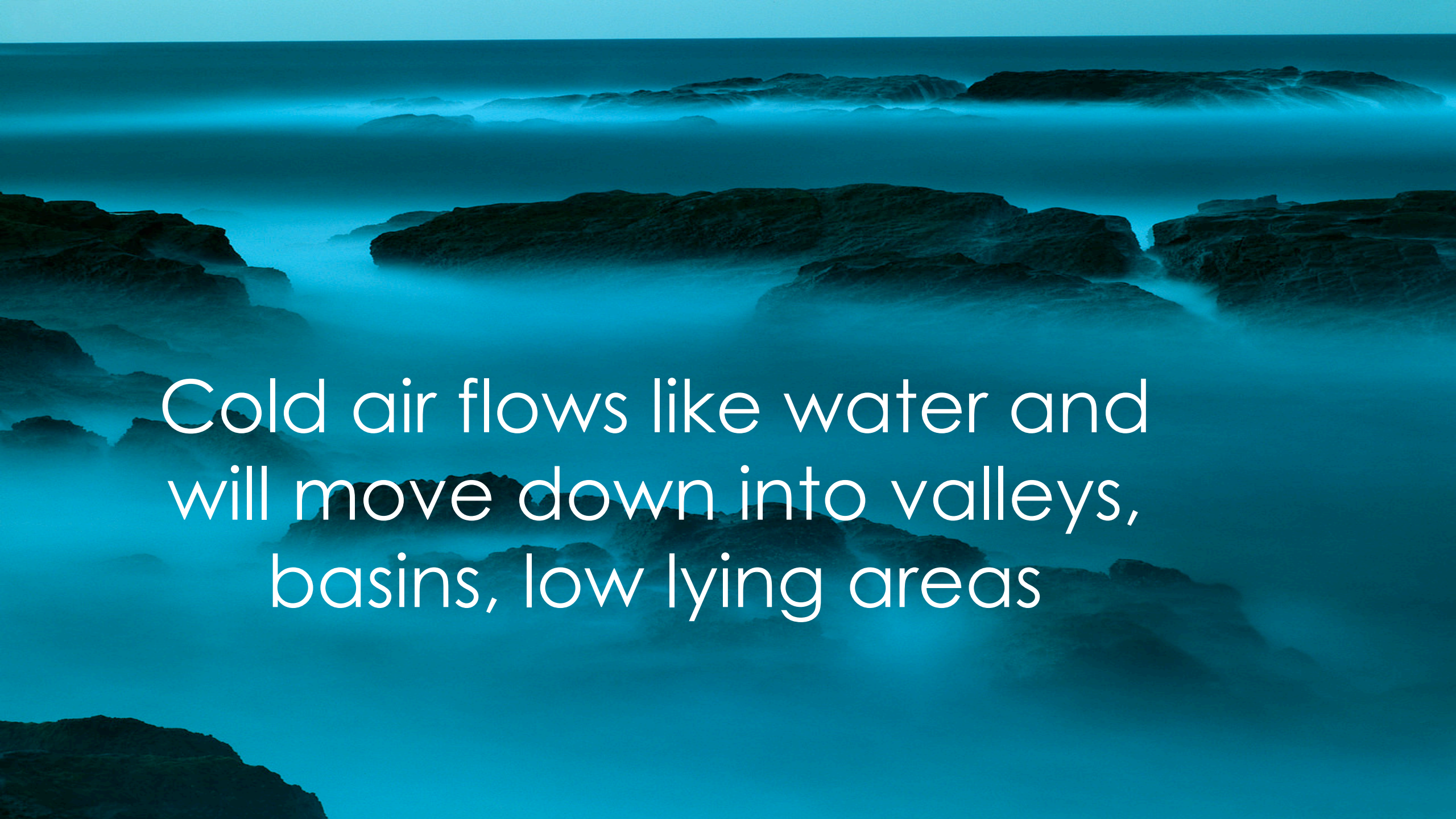

Cloud cover blocks radiation, so no inversion
Partial cloud cover allows some radiation, so a weak inversion develops

A Perfect ***Inversion*** Storm

1. Requires radiation from surface objects into a cloudless or near cloudless sky
2. Requires light and variable winds with minimal mixing of the lower atmosphere.
3. Begins in the mid to late afternoon and intensifies throughout the night until dawn. (The inversion will then dissipate into mid-morning.)
4. Includes an unsuspecting applicator who does not recognize there is a problem until it is too late.

Environmental conditions making matters worse

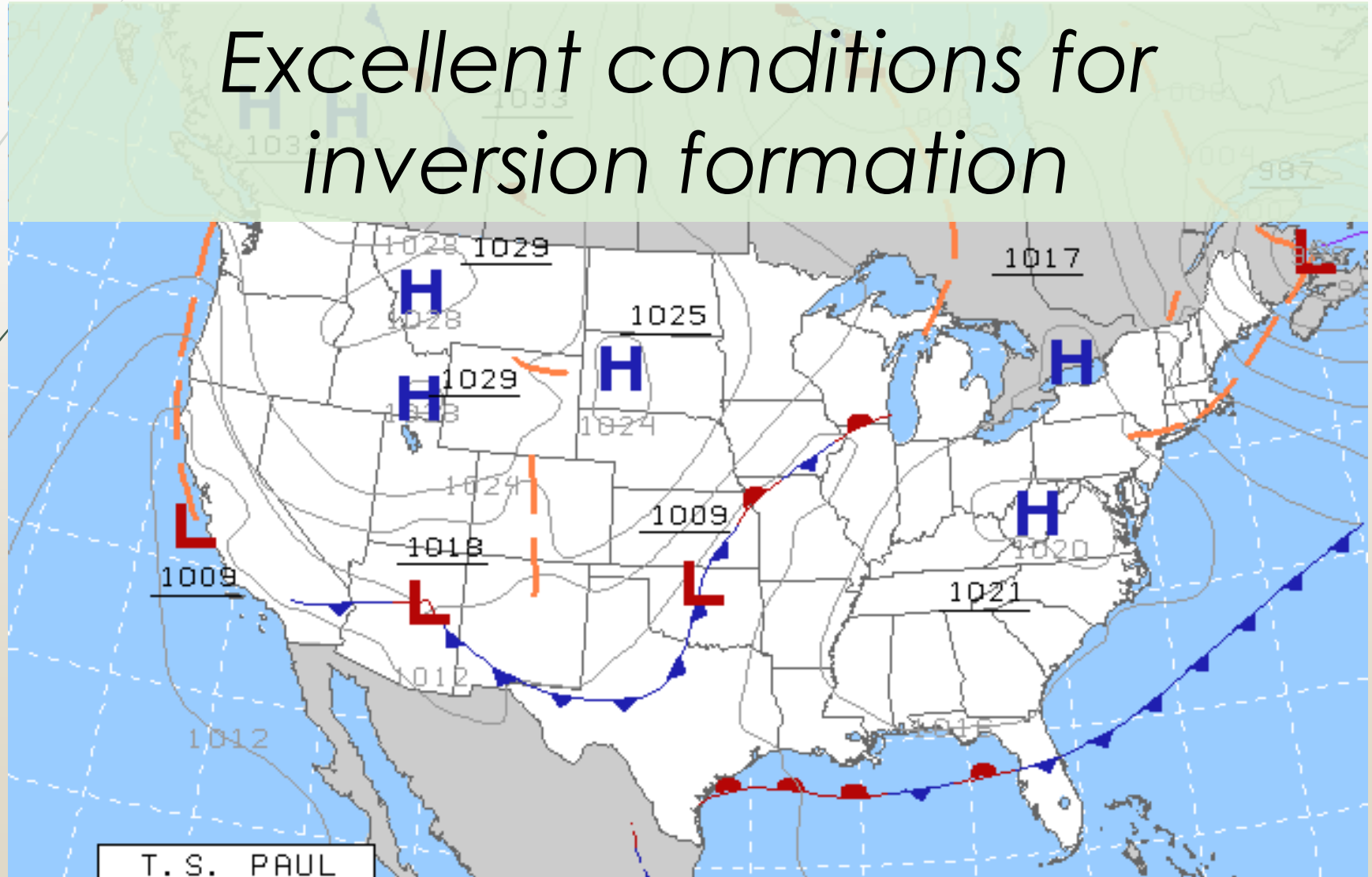
- Topography—low lying area or a protected area shielded from the sun and / or wind.
- Stagnant and / or intense high pressure system
- Relatively low humidity conditions


Cold air flows like water and
will move down into valleys,
basins, low lying areas

Cold air moves into a low lying pasture

Cold air moves into a low lying ditch

High Pressure Areas are associated with cool /dry air, clear skies & stable winds



Humidity

High humidity rainforest

Low humidity desert

- inversion builds **faster**
- intensity is **greater**
- dissipates **faster**

Surface conditions making matters worse

- Exposed soil that:
  - Has a low moisture content
  - Is sandy or coarse textured
  - Has been freshly tilled
- Soil that is heavily mulched and/or covered with heavy crop residue
- Closed crop canopy and or complete vegetative ground cover
- Wind breaks and/or shelter belts

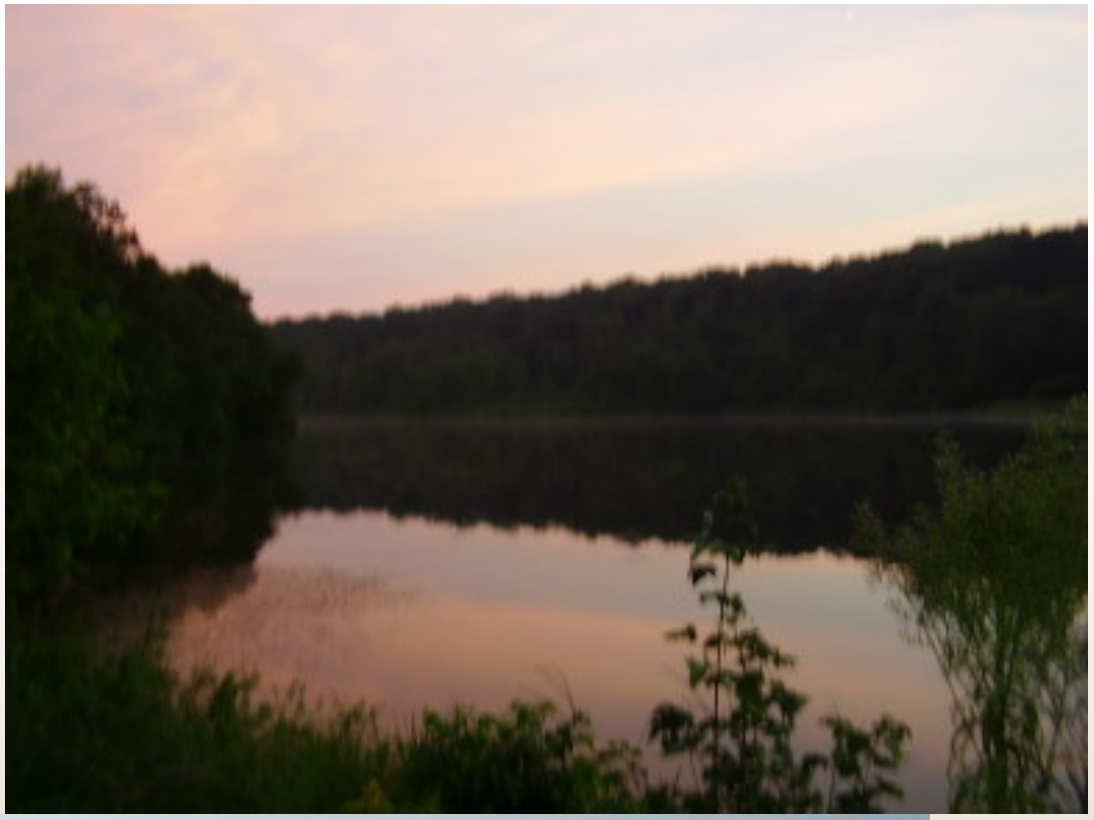
Clues about inversions

You can smell them


You can see it in a morning
or evening mirage


Dust from vehicles or farm
machinery will hang in the air

You can hear it



A Perfect ***Inversion*** Storm

1. Requires radiation from surface objects into a cloudless or near cloudless sky
   - 25% or less cloud cover
2. Requires light and variable winds with minimal mixing of the lower atmosphere.
   - Especially 0 to 3 mph
   - Remain cautious with winds of ***4 to 6 mph***

A Perfect ***Inversion*** Storm

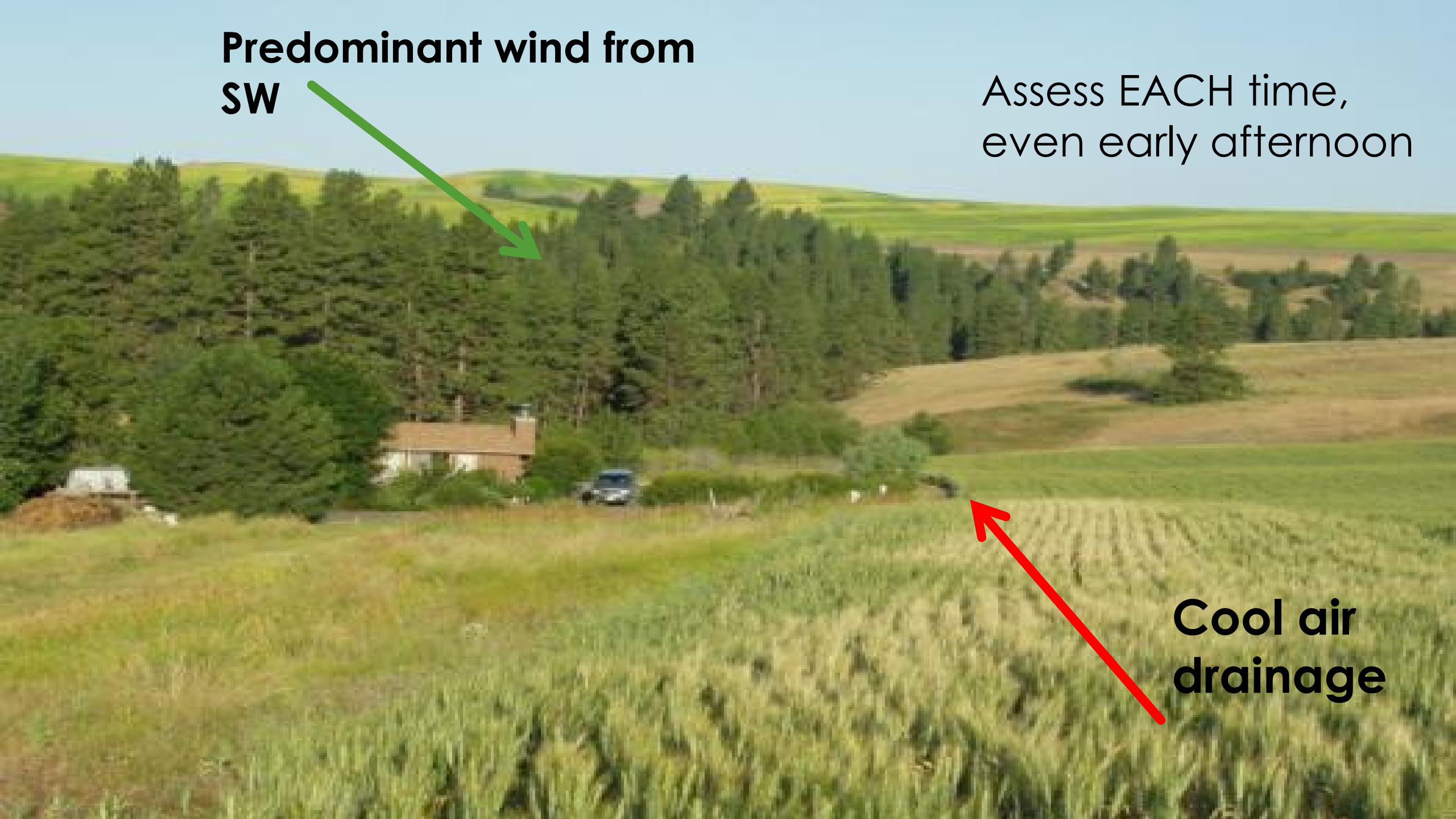
4. Begins in the mid to late afternoon and intensifies into the night. (The inversion will then dissipate into mid-morning.)
   - Especially 1-3 hours before sunset
   - Especially 1-2 hours after sunrise

A Perfect ***Inversion*** Storm

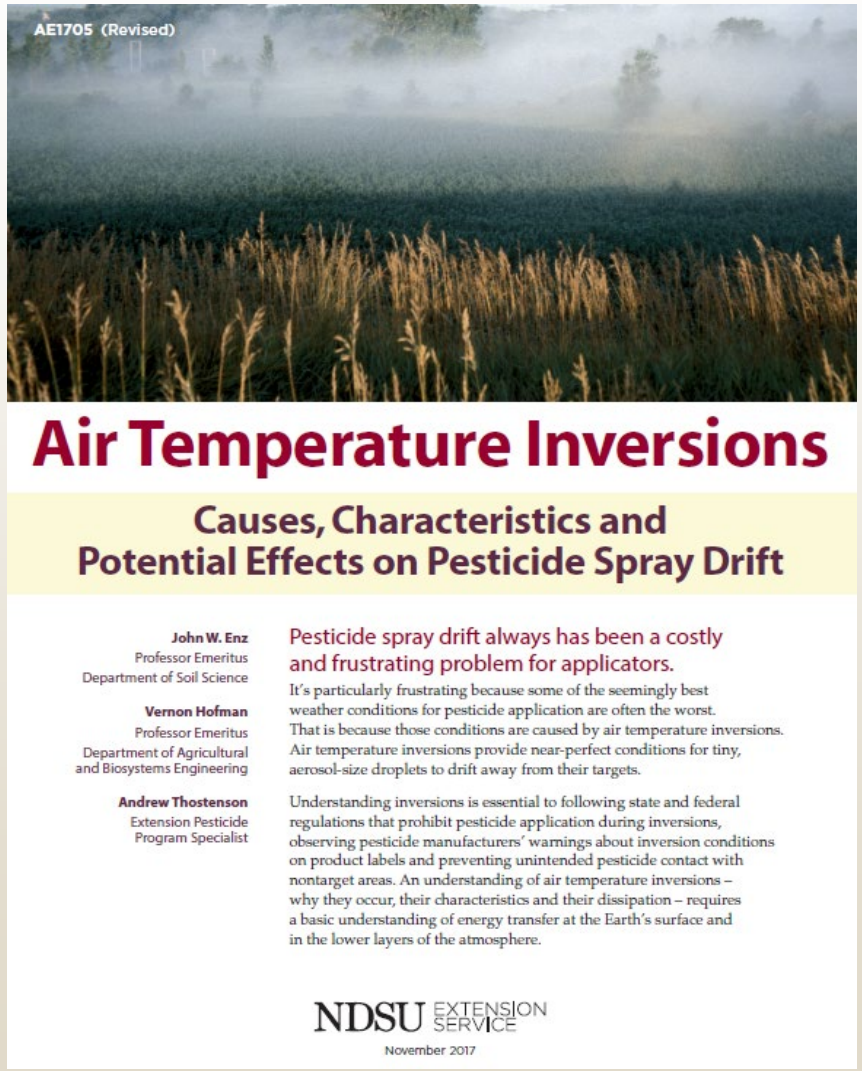
5. Includes an unsuspecting applicator who does not recognize there is a problem:
   - Applicator who has been shut down for several days (due to high winds) and is desperately looking for an opportunity to spray
   - Applicator who is has been spraying for many hours and loses track of weather conditions, especially in the late afternoon / early evening

Late afternoon / evening spraying

Inversions during this time of the day could have serious consequences


Predominant wind from SW
Assess EACH time, even early afternoon
Cool air drainage

A means to quickly assess an inversion



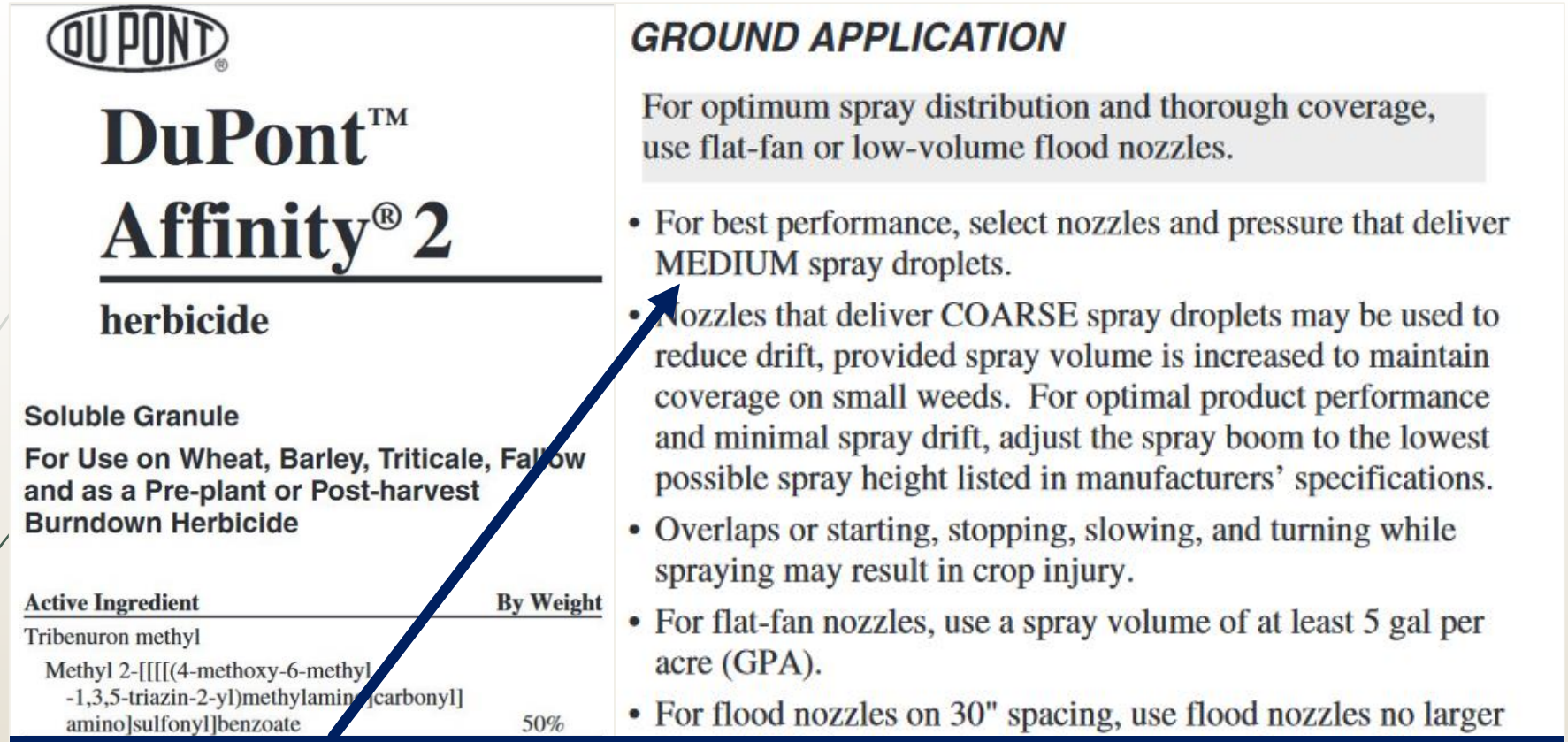
A Lesson in Spray Quality and Droplet Size

Carol Black

Extension Specialist

Washington State University

Why These Photos for Foresters



DUPONT

DuPont™ Affinity® 2

herbicide

Soluble Granule

For Use on Wheat, Barley, Triticale, Fallow and as a Pre-plant or Post-harvest Burndown Herbicide

Active Ingredient	By Weight
Tribenuron methyl Methyl 2-[[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)methylamino]carbonyl]amino]sulfonyl]benzoate	50%

GROUND APPLICATION

For optimum spray distribution and thorough coverage, use flat-fan or low-volume flood nozzles.

- For best performance, select nozzles and pressure that deliver MEDIUM spray droplets.
- Nozzles that deliver COARSE spray droplets may be used to reduce drift, provided spray volume is increased to maintain coverage on small weeds. For optimal product performance and minimal spray drift, adjust the spray boom to the lowest possible spray height listed in manufacturers' specifications.
- Overlaps or starting, stopping, slowing, and turning while spraying may result in crop injury.
- For flat-fan nozzles, use a spray volume of at least 5 gal per acre (GPA).
- For flood nozzles on 30" spacing, use flood nozzles no larger

For best performance, select nozzles and pressure that deliver MEDIUM spray droplets.

HERBICIDE

Rugged®

By WINFIELD

AgriSOLUTIONS

ACTIVE INGREDIENT:

2,4-Dichlorophenoxyacetic Acid*..... 38.4%
OTHER INGREDIENTS: 61.6%
TOTAL 100.0%

*Contains 3.49 lbs. of 2,4-dichlorophenoxyacetic acid per gallon.

Protected by U.S. Patent No. 8,298,992

KEEP OUT OF REACH OF CHILDREN

DANGER PELIGRO

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS

DANGER: Corrosive. Causes irreversible eye damage. Harmful if absorbed through skin or swallowed. Do not get in eyes or on clothing. Wear protective eyewear (goggles, face shield, or safety glasses). Avoid contact with skin.

FIRST AID

IF IN EYES:	Hold eyelids open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes; then continue rinsing. Call a poison control center or doctor for treatment advice.
IF ON SKIN OR CLOTHING:	Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

Droplet Size

When applying sprays that contain 2,4-D as the sole active ingredient, or when applying sprays that contain 2,4-D mixed with active ingredients that require a Coarse or coarser spray, apply only as a Coarse or coarser spray (ASAE standard 572) or a volume mean diameter of 385 microns or greater for spinning atomizer nozzles.

When applying sprays that contain 2,4-D mixed with other active ingredients that require a Medium or more fine spray, apply only as a Medium or coarser spray (ASAE standard 572) or a volume mean diameter of 300 microns or greater for spinning atomizer nozzles.

Sole Ingredient: Apply only as a **Coarse** or **coarser spray** (ASAE standard 572)

Mixed Ingredients: Apply only as a **Medium** or **coarser spray** (ASAE standard 572)

Terminology - Micron – µm

One micron (µm) =1/25,000 inch = 1/1,000 millimeter

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

Driftable fines under 150 µm

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

Why Use Different Spray Qualities

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

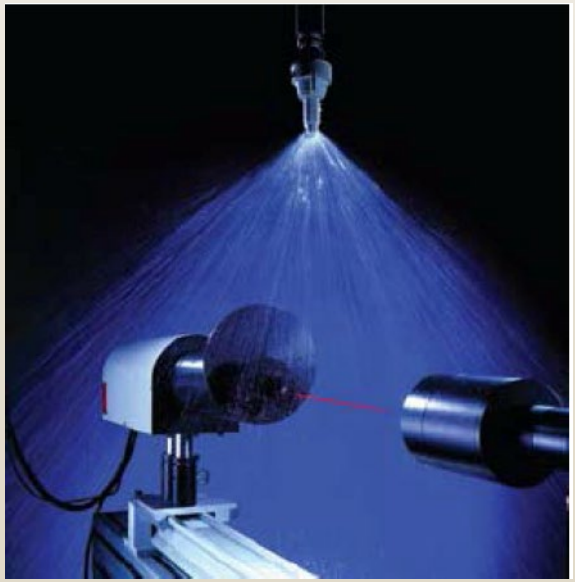
Fungicides/Insecticides

Contact Herbicides

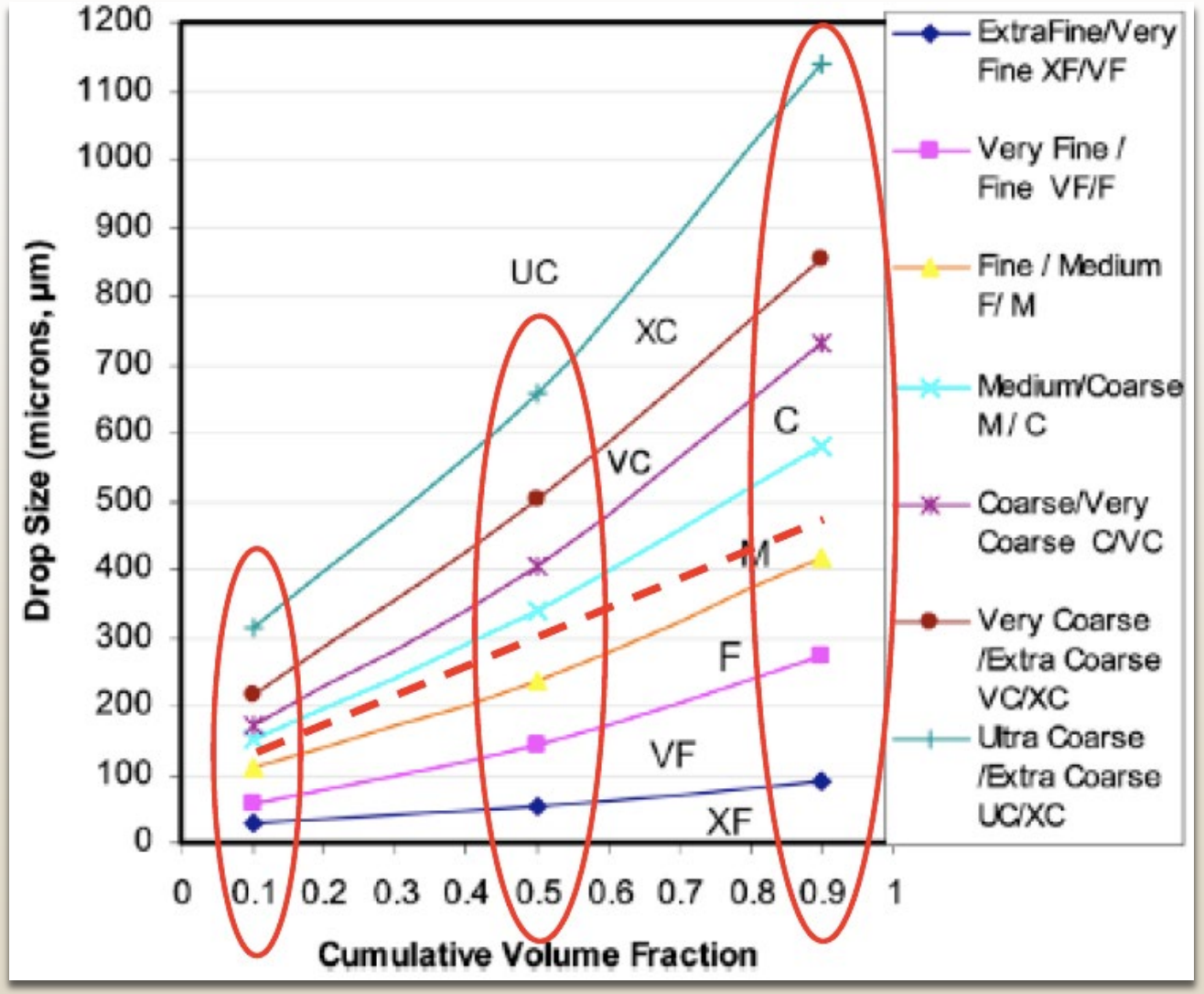
Systemic Herbicides

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

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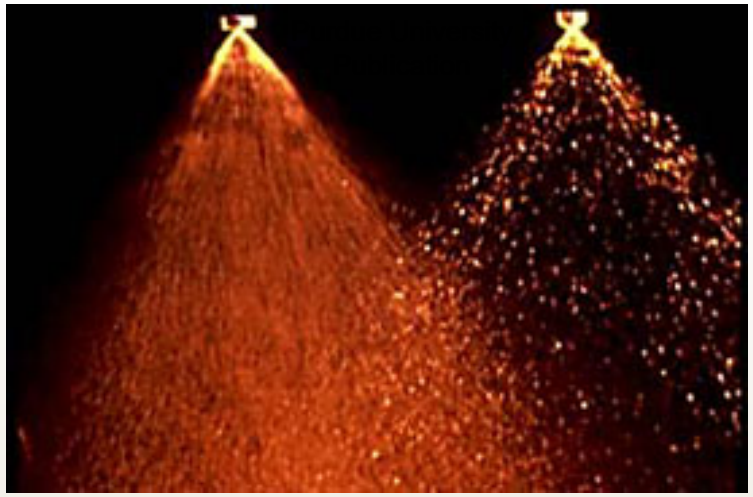
Based on ASABE 572.1 Standards

- Worker Protection Standard Application Exclusion Zone (AEZ)
  - 100' AEZ: if **fine, very fine, extra fine spray quality**
  - 25' AEZ: if height >12" **medium, coarse, very coarse, extra coarse, ultra-coarse spray quality**
  - No AEZ: if height <12" **medium or larger** spray quality
- Herbicide Labels
  - Minimum **medium or coarse spray quality**

Spray Spectrum = Quality

Put all the Same Similar Sized Droplets in a Test Tube



Huge drops

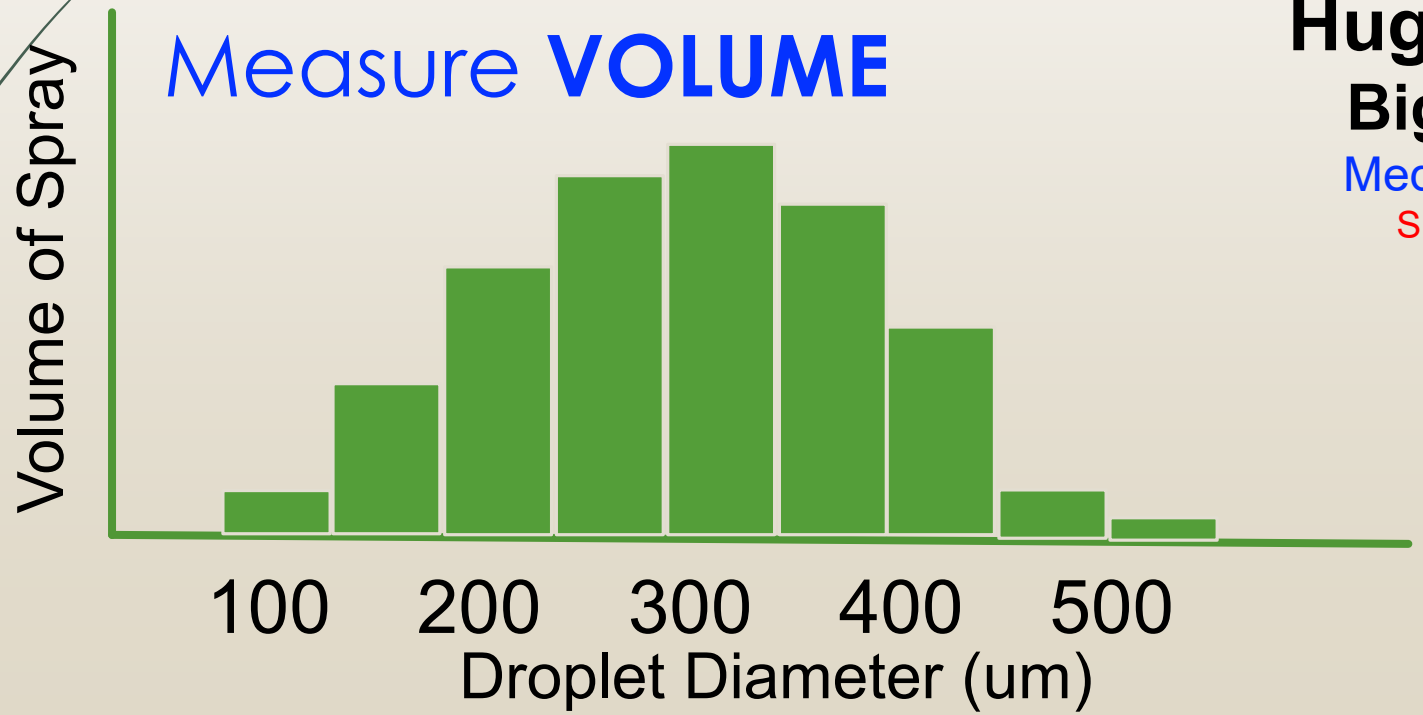
Big drops

Medium drops

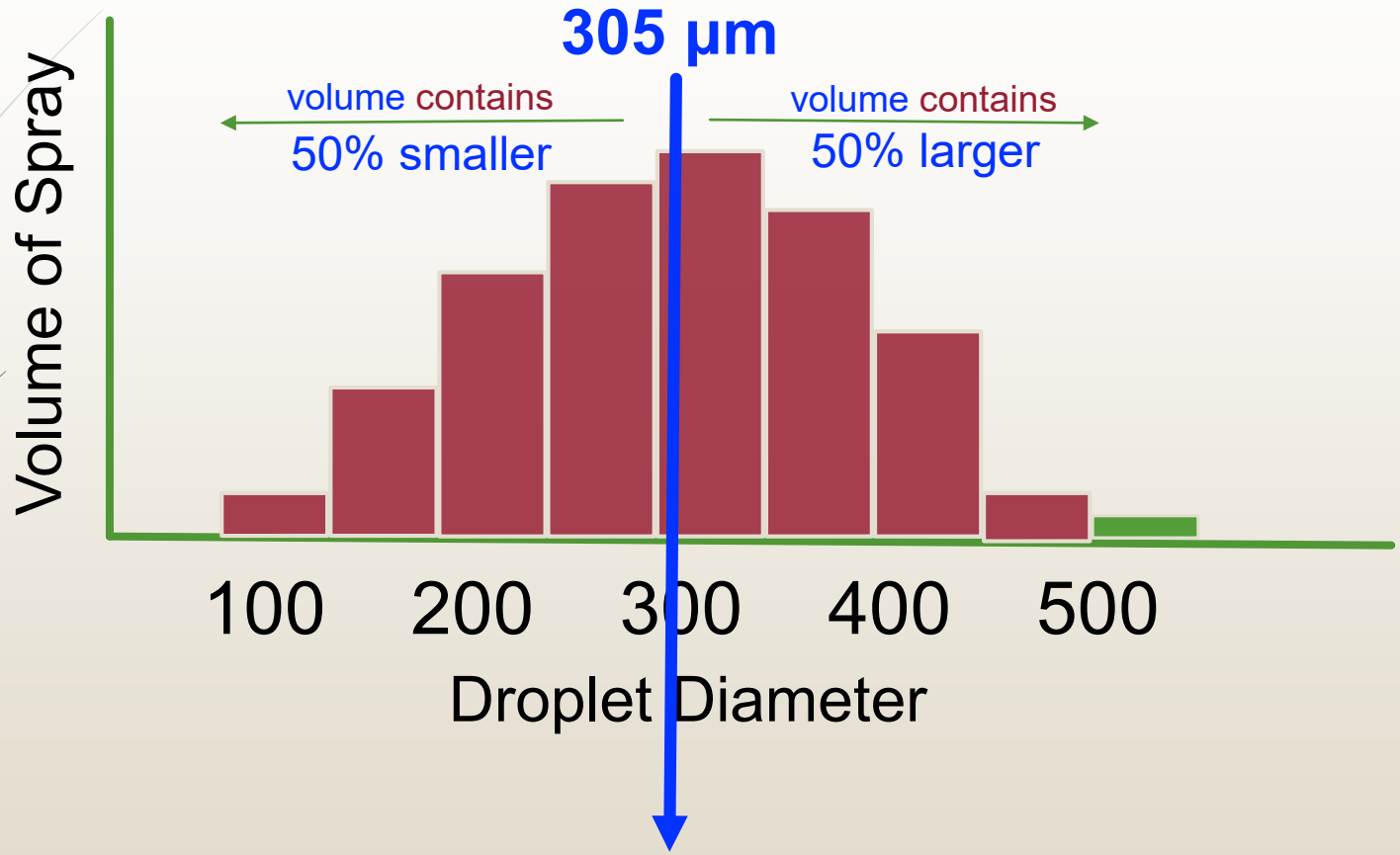
Small drops

Tiny drops

Measure **VOLUME**



Spray Quality and the VMD (volume median diameter)

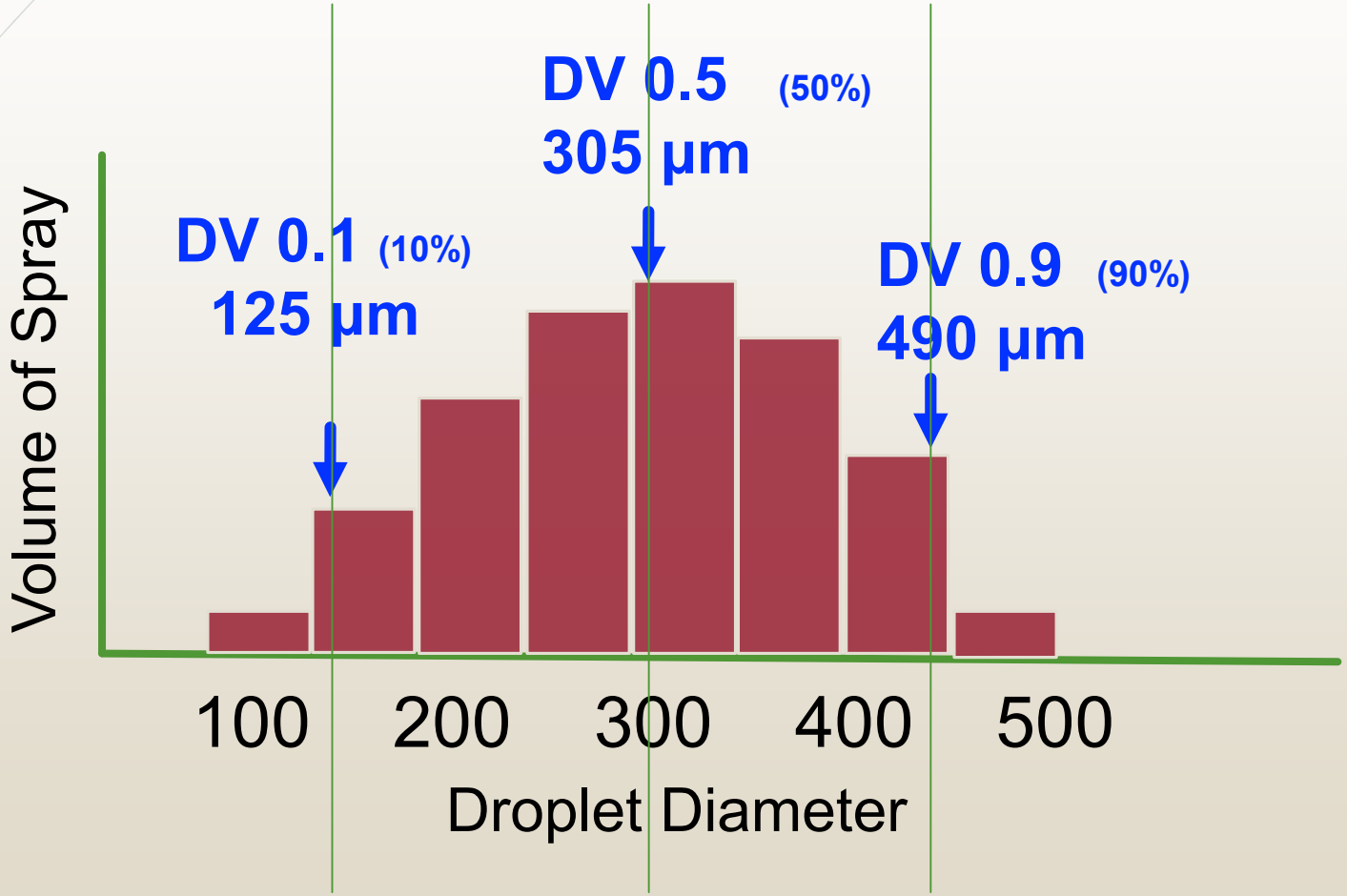


VMD - volume median diameter - Dv0.5 (50%)

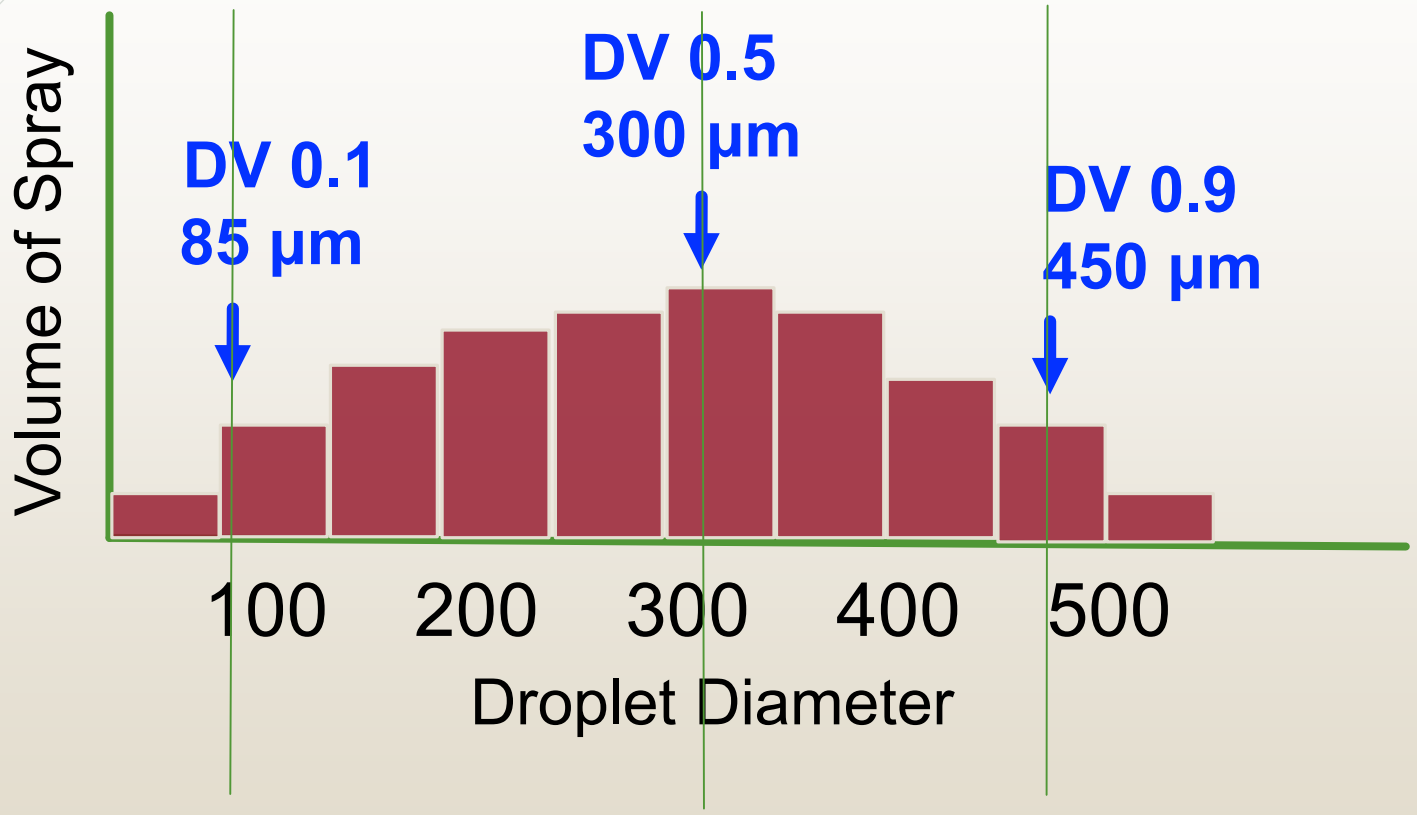
Half the total spray volume is **smaller** and **half** is **larger**

This is the MEDIAN, not the average

Spray Quality - Explained



Spray Quality - Explained



Similar VMD

Lot's more fines: < 150 µm

Lot's more basketballs: > 500 µm

Spray Quality Categories	
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Medium (M)	Yellow
Coarse (C)	Blue
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Ultra Coarse (UC)	Black

Spray Quality Color
does not
equate to
Nozzle Color

The Color Confusion Challenge: Tips and Spray Quality

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

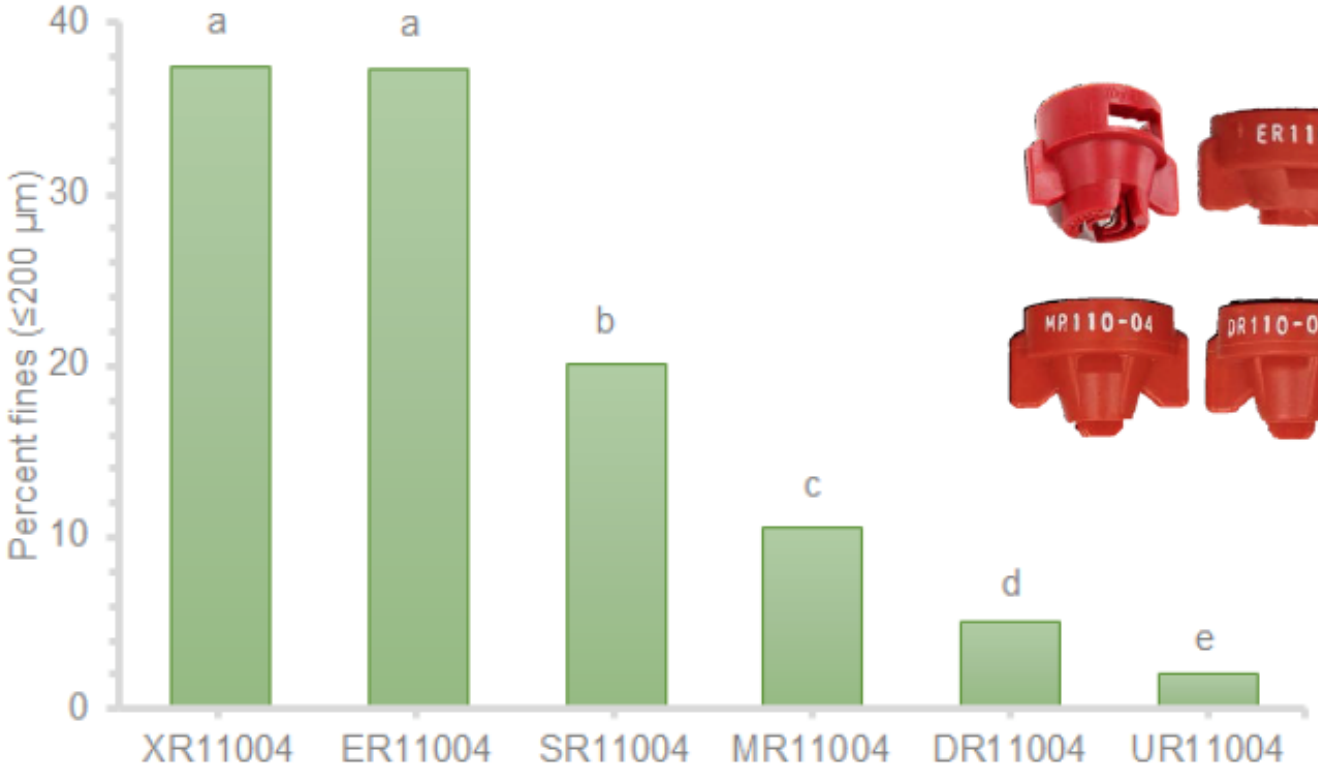
80°

80° & 110° > fines

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

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

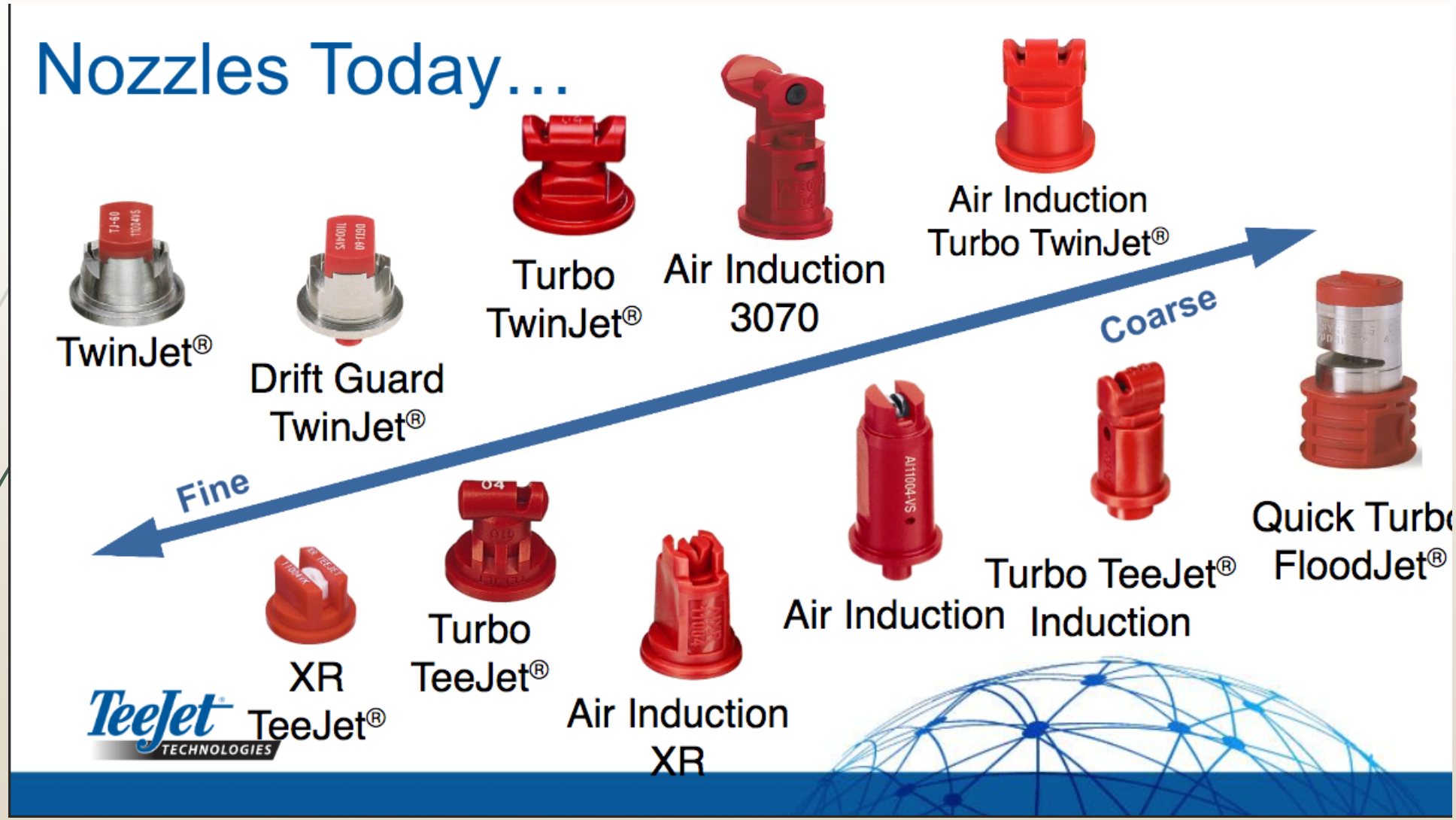
Droplet Sizes Vary Among Nozzle Types
--- % of fines – less than 200 µm



†**Figure 6.** Comparison of percent of fine droplets (≤200 µm) for six non-venturi nozzles.

Thomas R. Butts, Annah M. Geyer, and Greg R. Kruger (2015)
Department of Agronomy & Horticulture, University of Nebraska-Lincoln

Nozzles Today…



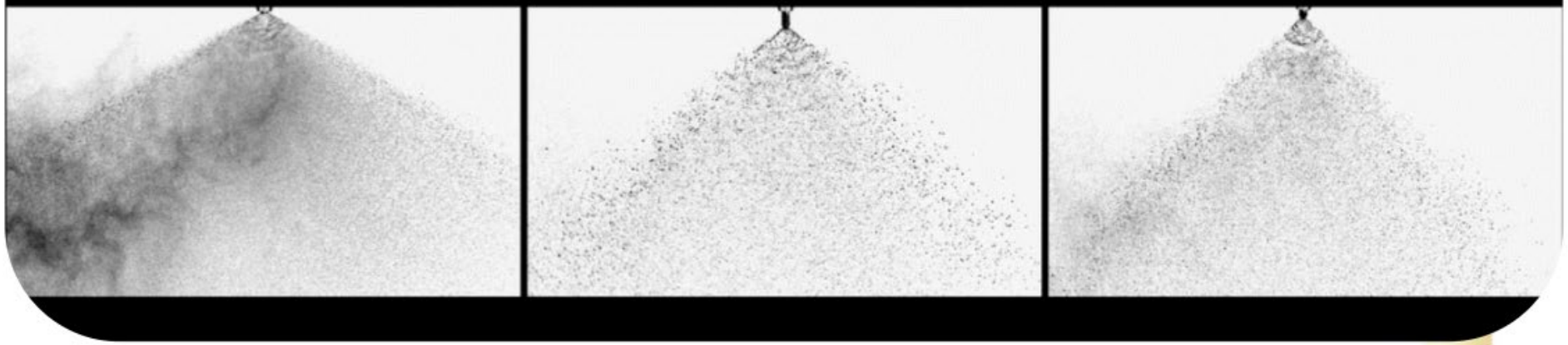
XR Flat Fan Nozzle

Images from
Spraying Systems

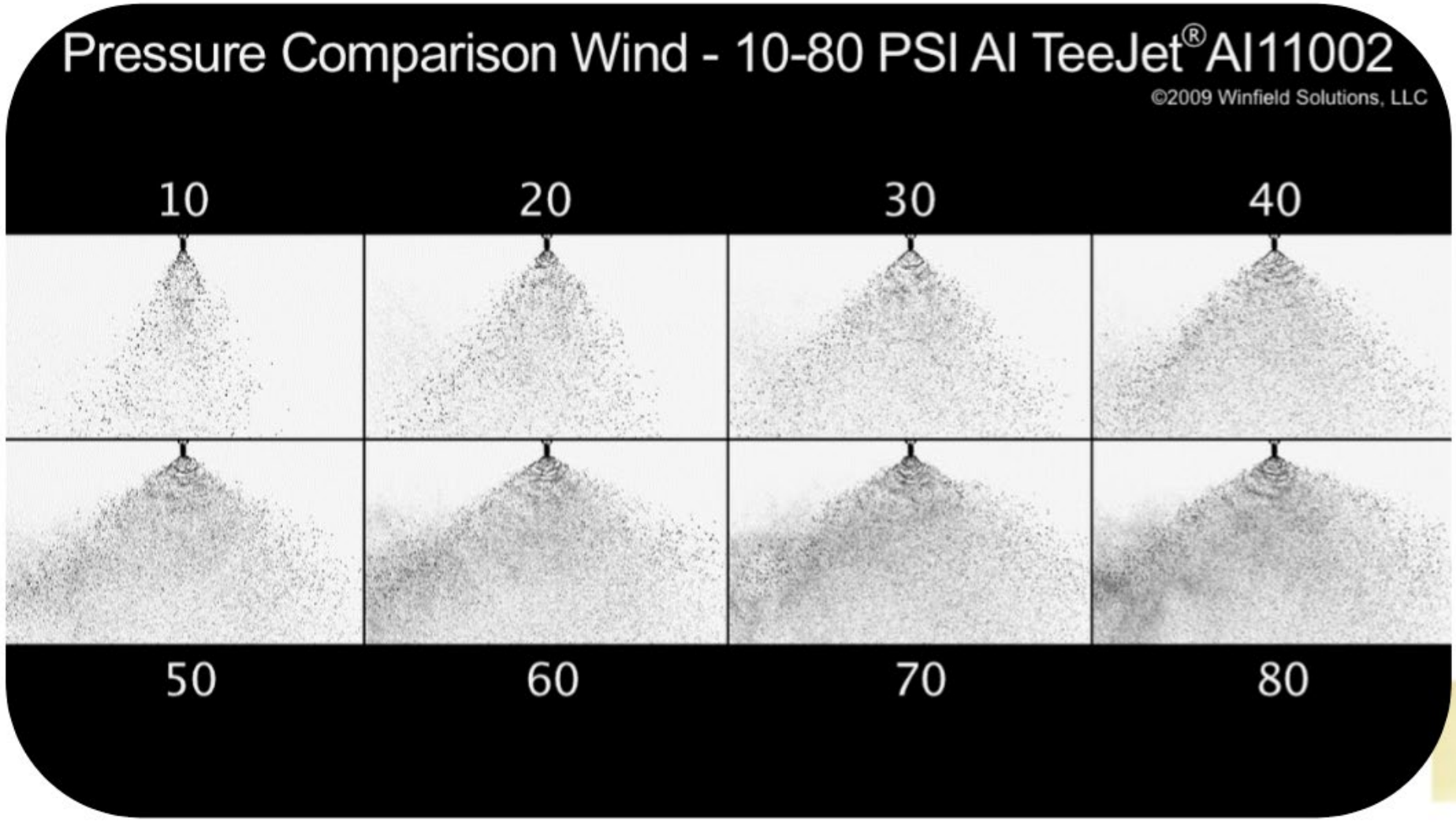
Older
and
Newer
Nozzle Designs

Turbo TeeJet Induction (TTI)

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



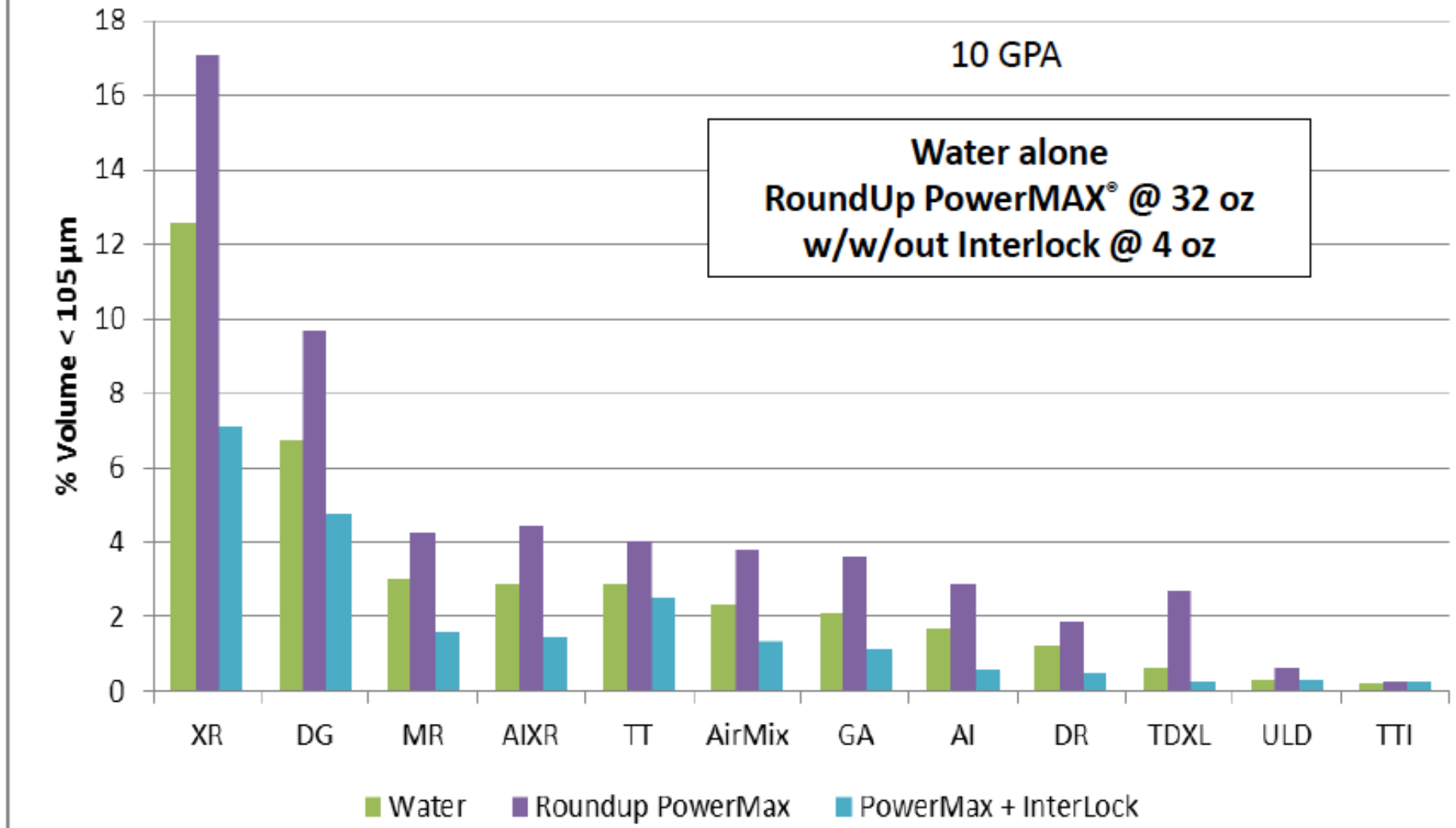
WINFIELD



Water

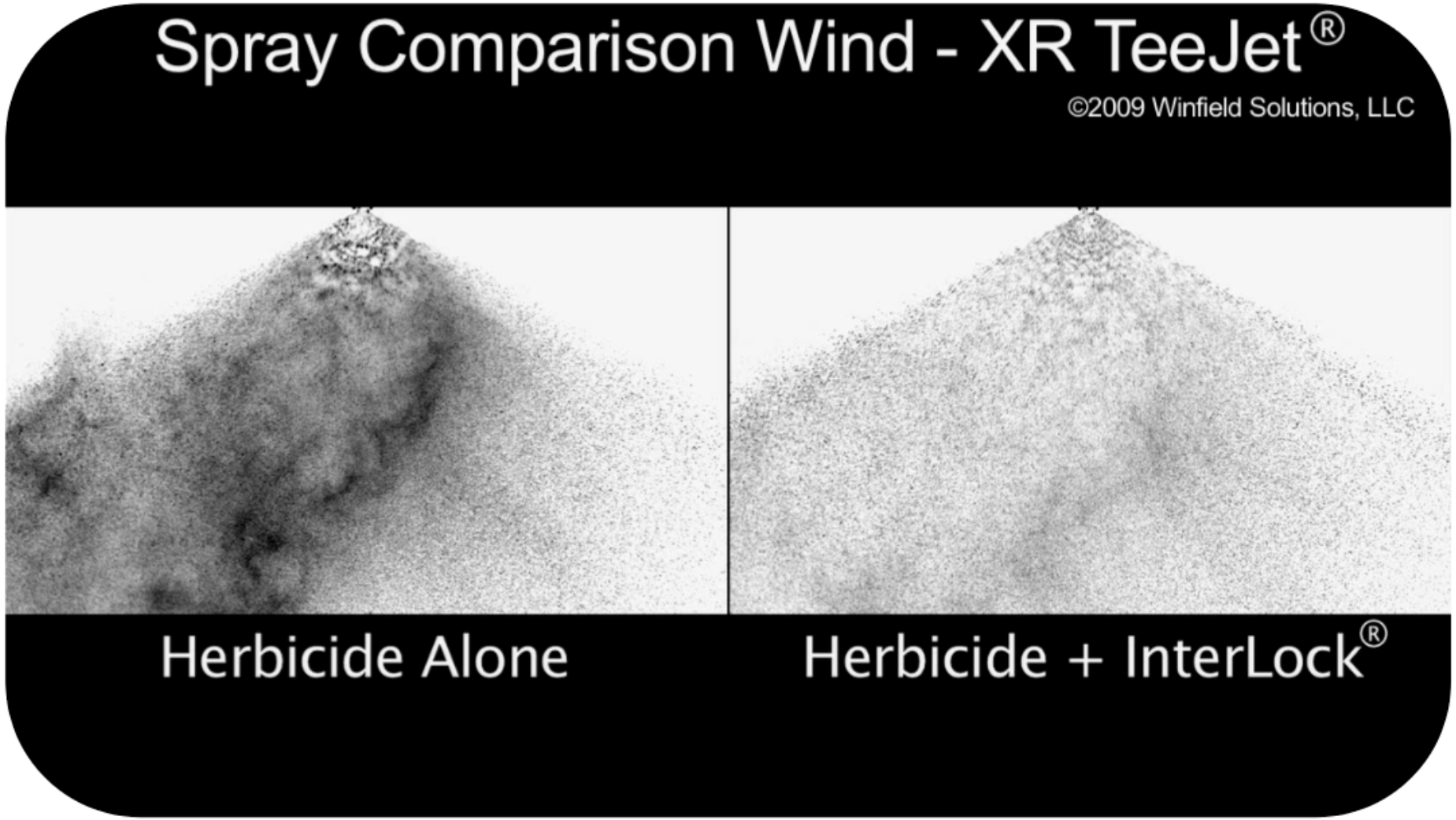
WINFIELD

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

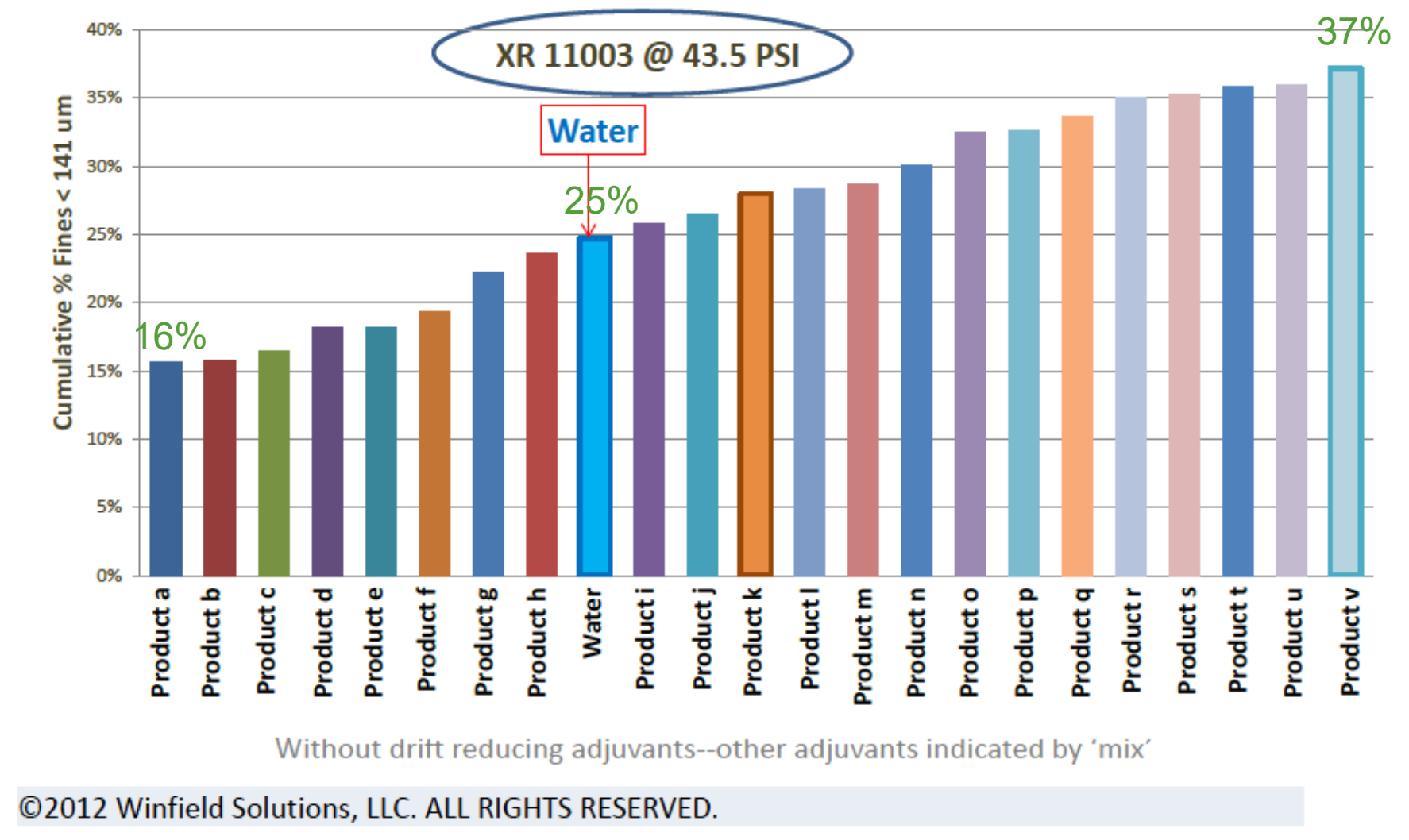


Spray Adjuvants

Some adjuvants hold droplets together, others breakup more easily!



Tank Mix Influences Droplet Size



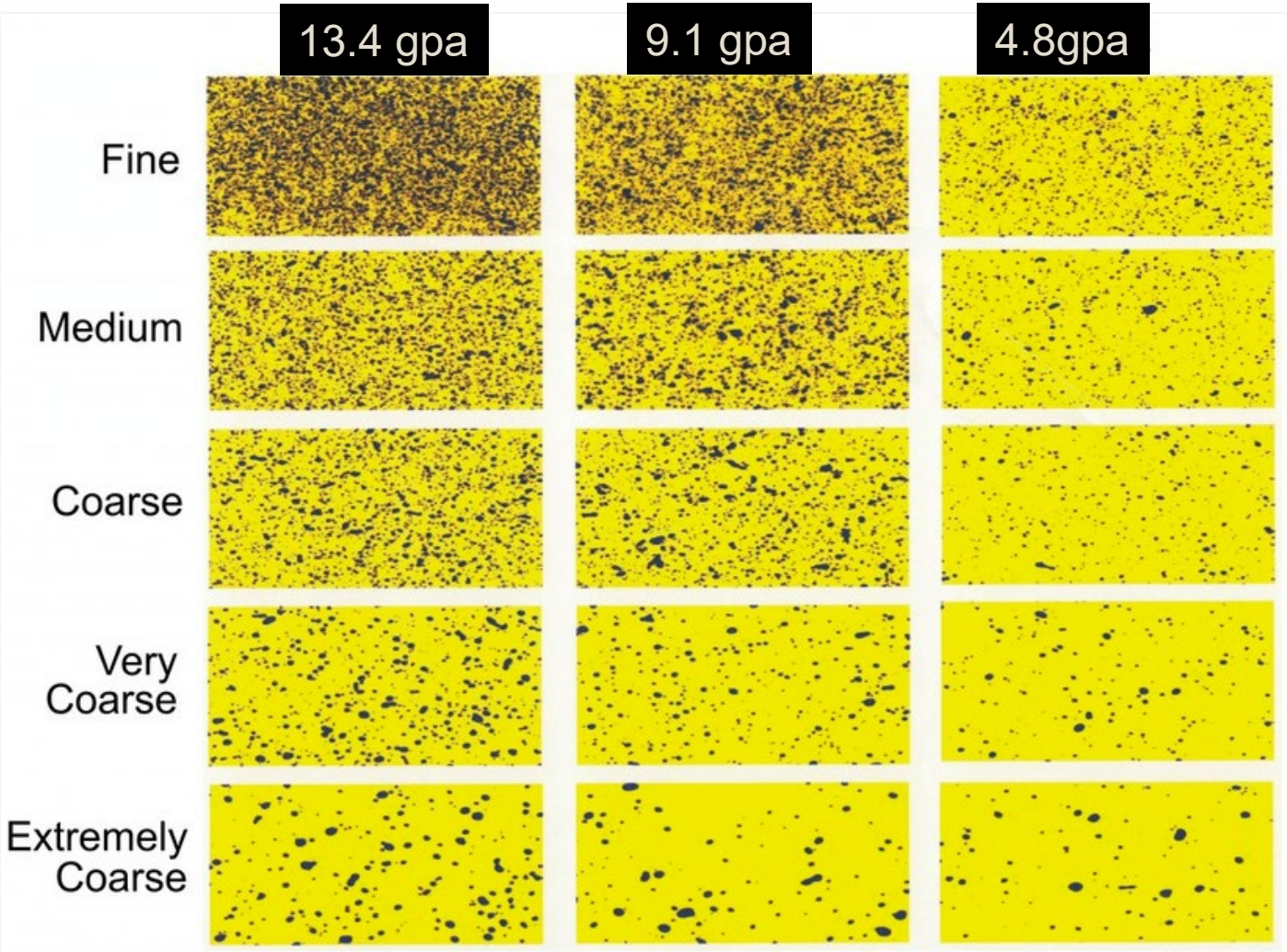
Without drift reducing adjuvants--other adjuvants indicated by 'mix'

Why Use Different Spray Qualities

Broadcast Nozzle Selection Guide

	HERBICIDES			FUNGICIDES		INSECTICIDES		DRIFT MANAGE-MENT	PWM NOZZLE CONTROL
	SOIL APPLIED	POST-EMERGENCE		CONTACT	SYSTEMIC	CONTACT	SYSTEMIC		
		CONTACT	SYSTEMIC						
 *Air Induction Turbo TwinJet®* Reference page 17	VERY GOOD	GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD	EXCELLENT	EXCELLENT	
 *AI3070®* Reference page 18		VERY GOOD	VERY GOOD	EXCELLENT	VERY GOOD	EXCELLENT	VERY GOOD	EXCELLENT	
 *XR, XRC TeeJet®* Reference pages 12–13		EXCELLENT	GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD	GOOD	EXCELLENT
 *XR, XRC TeeJet®* 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
 *AIXR TeeJet®* Reference page 8	VERY GOOD	GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD	EXCELLENT	EXCELLENT	
 *AI, AIC TeeJet®* Reference pages 9–10	VERY GOOD	GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD	EXCELLENT	EXCELLENT	

Coverage and Droplet Size



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.

Sprayers 101 - T. Wolf

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 (110º)	19%	30%
TT – Turbo TeeJet (110º)	4%	13%
TTJ60 – Turbo TwinJet (110º)	3%	10%
TF – Turbo FloodJet	2%	7%
AIXR – Air Induction XR (110º)	2%	7%
AITTJ60 – Air Induction Turbo TwinJet (110º)	1%	6%
AI – Air Induction TeeJet (110º)	N/A	5%
TTI – Turbo TeeJet Induction (110º)	<1%	2%

*Data obtained from Oxford VisiSizer system spraying water at 70ºF (21ºC) under laboratory conditions.

AIXR Teejet

	PSI	DROP SIZE	CAPACITY ONE NOZZLE IN GPM	CAPACITY ONE NOZZLE IN OZ./MIN.	GPA 4 MPH	5 MPH	6 MPH	8 MPH	10 MPH	12 MPH
AIXR110015 (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
AIXR11002 (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
AIXR110025 (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

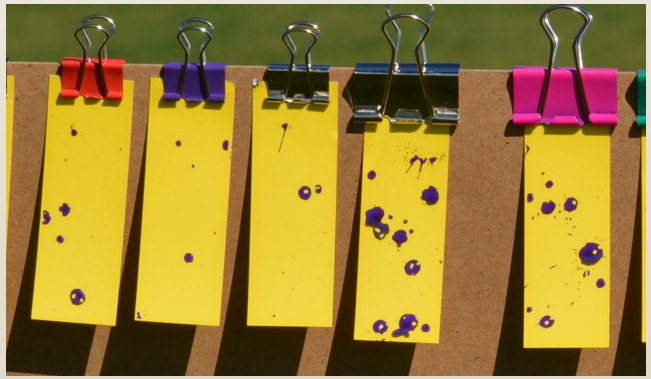
DG Teejet

	PSI	DROP SIZE 80°	DROP SIZE 110°	CAPACITY ONE NOZZLE IN GPM	CAPACITY ONE NOZZLE IN OZ./MIN.	GPA 4 MPH	5 MPH	6 MPH	8 MPH
DG80015† DG110015 (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
DG8002† DG11002 (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
DG8003† DG11003 (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

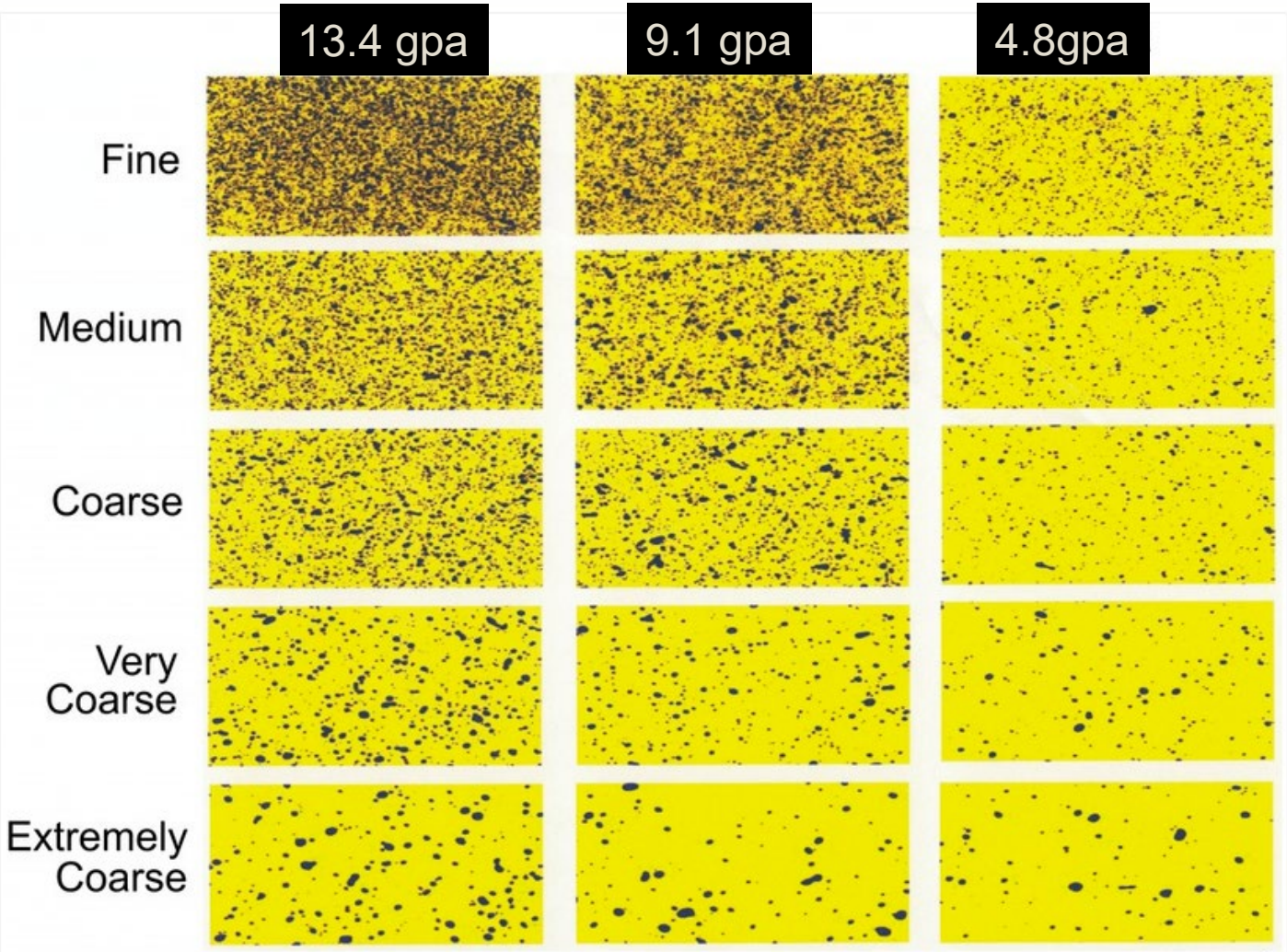
80 or 110

Tools for Aerial Applicators

SELF-REGULATING APPLICATION & FLIGHT EFFICIENCY
OPERATION S.A.F.E.®



Get and Use Droplet Cards for Deposition and Pattern



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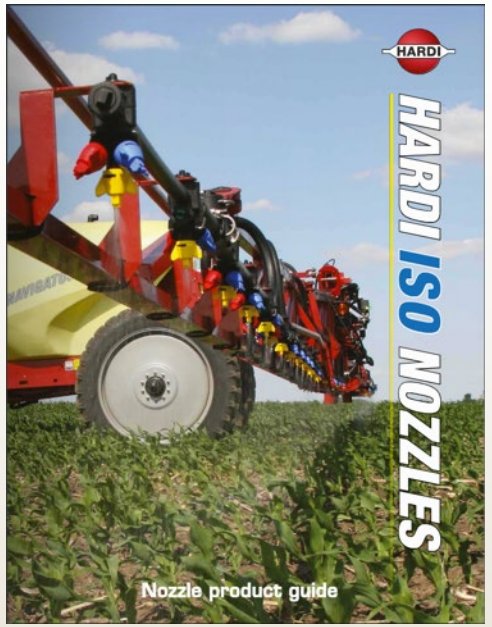
Sprayers 101 - T. Wolf



GREENLEAF TECHNOLOGIES

CP® PRODUCTS COMPANY

Communication About Herbicide Use in Forestry is Critical

Concern over pesticide use is growing

- More people are becoming aware of use
- Lack of understanding leads to fear
- Fear and misunderstanding spread on social media

Pesticide = Herbicides, **INSECTICIDES**, Fungicides, Antimicrobials, etc.

How do people form opinions?

- People no longer trust traditional sources of information like the news or the government. They do trust:
  - Health professionals (loosely defined)
  - Family members
  - Friends

  ---------- Less than 20% trust ----------
  - TV news
  - Newspapers
  - US Government

How did society get here?

- In the digital age, public opinion is shaped by shareable information
- It's much easier to frighten people with sensational sound bites than to educate them about science
- **People with knowledge who get active and speak-out can improve understanding**

How do we reach concerned citizens?

- Be ready to respond when they ask questions
- Cause and effect – **how does controlling weeds benefit them?**
- Use information that is searchable and shareable – provide websites where they can get more information
- Help them be the smartest person in the room

People want to be listened to

- **Don't ! ! ! !**
  - Act superior
  - Sound condescending
  - Talk down
  - Imply they just don't understand

People want to be heard

- Do
  - Listen
  - Stay relaxed
  - Be friendly
  - **Acknowledge their concerns are valid**
  - Empathize

I don't just listen to your words.
I watch your face.
I stare at your eyes.
I notice your tone.
I observe your body language.
I interpret your silences.
I hear what you don't say.
And most importantly, I trust my own intuition.

Nobody cares how much you know,

until they know how much you care.

Theodore Roosevelt

Where to begin?

- **Ask questions to understand their concerns**
- **Try to SEE through their eyes**
- Use your own life experiences as examples
- It's ok to acknowledge the "old herbicide days" - but times have changed
- **Explain that herbicides are one piece of an overall management plan**

Messages – what works, what doesn't

Messages that work:

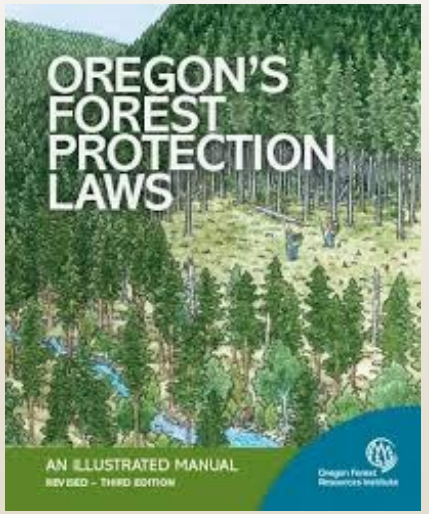
- Acknowledge concerns – empathize
- Articulate and clarify the KEY issues
- Find an emotional connection (hunting, kids, pets, wildlife)

Messages to avoid:

- Don't worry
- It won't hurt you
- Science
- Government regulation
- We're feeding the world

If open, share about regulatory changes over the years

- EPA enhances its risk assessment for human health and the environment every year.
  - Protecting endangered and threated species are reasons for newer herbicide mitigation measures
- Herbicides undergo re-evaluation by EPA when changes are made to use patterns or formulations
- State laws have been implemented to further protect forest resources and water quality



Ask, listen, relate

- Ask about their concerns
- **Listen**
- Find common ground
- Find a way to connect
- Nurture and protect your credibility
- Have your facts

Focus on the **benefits of herbicide use**

- Manage **invasive species**
  - Choke out native plants
  - Degrade wildlife habitat
  - Deer/ elk food sources reduced
  - Some invasive species are toxic to animals

Focus on the **benefits of herbicide use**

- Carefully prescribed herbicide use:
  - **Helps young trees outcompete weeds**
  - Stand improvements, thinning
  - Makes driving safer by improving visibility and drainage
  - Helps prevent wildfires
  - Protects habitat for fish and wildlife

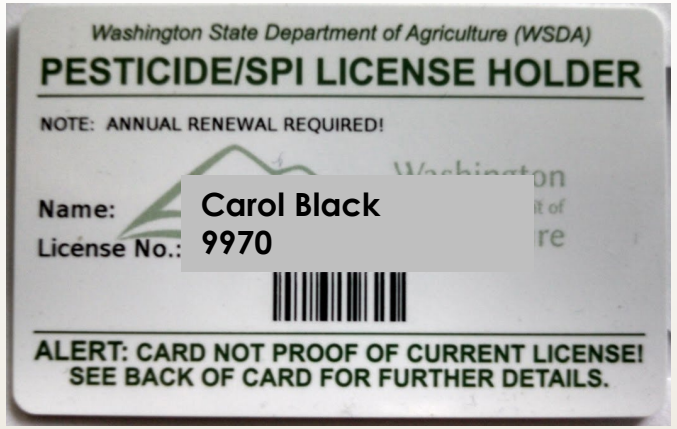
gardening.coloradohighaltitude.com

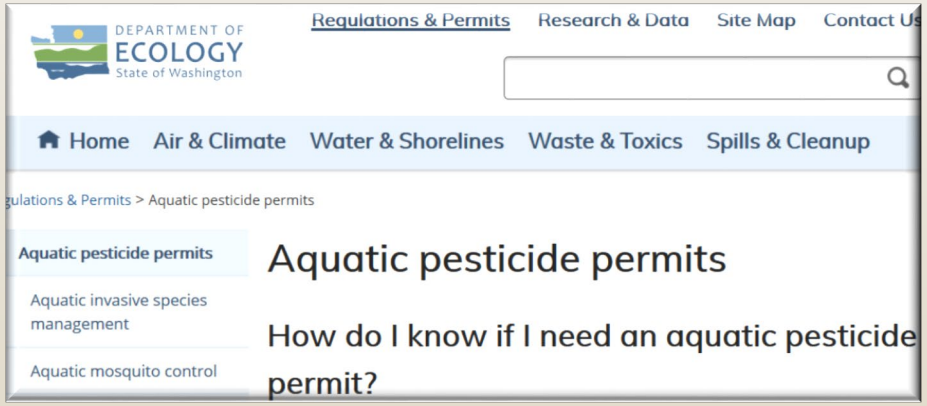
Make it personal

- Why is controlling weeds important to you?
  - It's your job
  - Forest products build homes and businesses
  - Traffic safety - want to make sure drivers can see
  - Hunters– want to improve habitat
  - Roadway maintenance allows access

Professional pesticide applicators – what the public doesn't know

- **Must be trained and pass a test**
- **Continuing education**
- Care about what they do and want to do it right
- **Follow the law – nothing into water without a permit**
- Precision: right tool, right time, right place, right amount





Who else uses pesticides?

Build relationships - support each other

- **County Weed Board** – invasive species
- **County Road Crew** – keep roadways safe and protect the asphalt from wear
- **Public Utilities** – to keep power lines active and safe
- **Ports** – invasive species, hazards
- **Foresters** – conifer release, noxious weeds, roadways

Who else uses pesticides?

- **Mosquito Control Districts** – human health vectors
- **Parks** - weeds
- **Agriculture** – weeds, plant pathogens, insects, rodents, storage pests
- **Golf Courses** – plant pathogens, weeds
- **Beekeepers** – parasites & pathogens

Why, when, how pesticides are applied in the forest

- Site Preparation
  - Foliar
- Conifer release
  - Foliar
  - Individual target vegetation
- Stand improvement, thinning
  - Foliar
  - Basal, frill, girdle, injection

Other options considered or integrated into the management plan -- Mechanical control considerations

- Workforce willing to do manual labor
- Injuries to workers in rough terrain
- Heat stress for workers
- Housing and transport to the job site
- Equipment upkeep, transport, impact on soils

Seek Communication Training
if you know you face contentious people

Maintain a catalog of current resources to share

- Forest Chemical Applications -
  - dnr.wa.gov/forest-chemical-applications
- Applying and Managing Pesticides -
  - dnr.wa.gov/applying-and-managing-pesticides

Who is NPIC?

An objective, science-based information service for pesticides

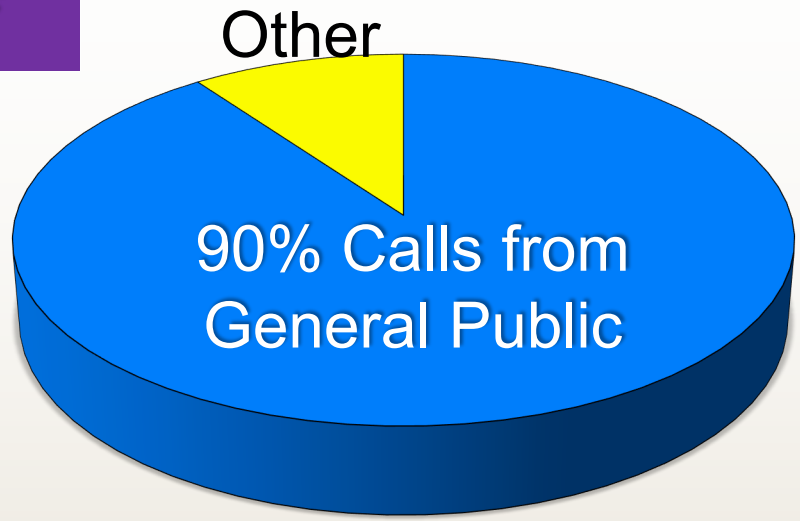
NPIC promotes informed decision-making, but is neither for, nor against, the use of pesticides

Toll-free phone service: **800-858-7378**

8:00 – 12:00 Pacific; 11:00 – 3:00 Eastern

NPIC.orst.edu

Audience



- ~11,000 questions/year
- Most questions about pesticides **in and around the home**
- ~15% of inquiries are pesticide incidents
- **Provide information for professionals also: medical, applicators, health departments, manufacturers, etc.**

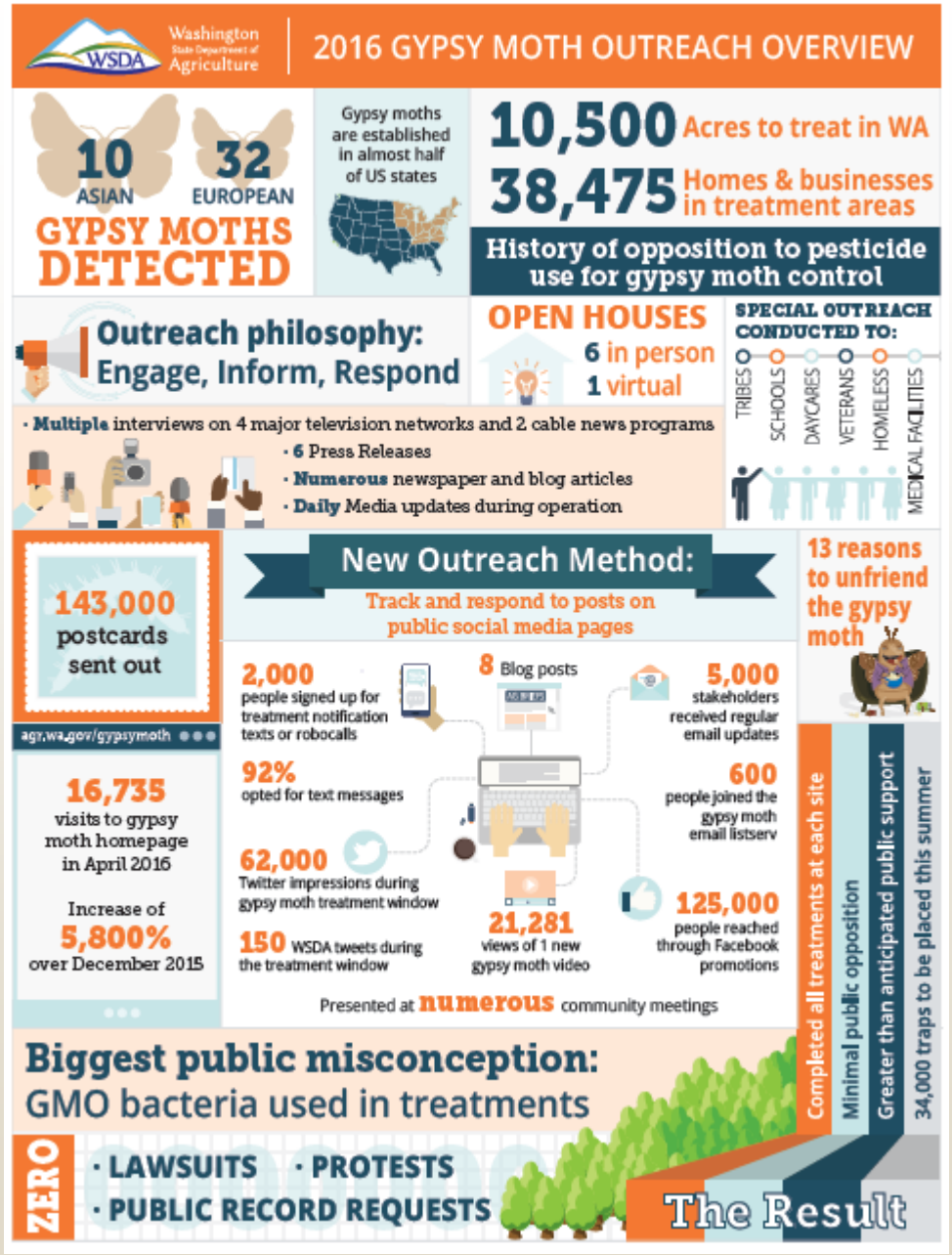



Specialists Talk to PEOPLE

- Translate technical scientific jargon for all audiences
- Connect people with local resources
- Calls in 240 languages
- **Evaluate and Communicate Risk**

Online – social media

- Monitor to learn what being said
- Engage, carefully
- Keep it positive
- Don't feed the trolls!



Build connections – help your community get to know you

- City Council
- County Commissioners
- Rotary Clubs
- Toastmasters

Forest Practices Are In the News ~ some people want a cause

SNOHOMISH COUNTY COMMUNITY RIGHTS (SCCR)
NO-SPRAY
SUMMARY INFORMATION FOR TOXIC PESTICIDE SPRAYING
AND COMMUNITY RIGHTS

The world is run by those who show up!

- Be the One!

Communicate with your neighbors, talk with other foresters about healthy discussions

Acknowledgements

- Teejet and Winfield Solutions
- Andrew Thostenson, North Dakota State University
- Heather Hansen, Washington Friends of Farms & Forests, www.wafriends.org

Carol Black

Pesticide Education Specialist

Protecting Yourself from Pesticide Residues

Closed System Loading of Liquids

Important Safety Information On Closed Systems

- **Closed System** - equipment that takes the pesticide out of its container for you and then rinses the container
- **PROPERLY** used systems
  - **PREVENT the pesticide from touching you**
  - MOVE pesticide into the application tank
  - RINSES the containers and hoses for you

Certain Practices Can Potentially Increase Your Exposure

- Certain container and equipment cleaning practices have been found to have the potential to greatly increase **your exposure potential**
  - Handling contaminated stingers
  - Rinsing stinger outside of the container
- Avoid these practices at all times

Returnable Containers

- **Do not** insert <u>your own stinger</u> into returnable containers
  - These containers are designed to be closed systems to reduce exposure to pesticides
  - If you can not use the built in extraction device, set up a gravity fed system.
  - <u>Using your own stinger</u>
    - increases exposure to unacceptable levels for risk mitigation
    - voids the engineering control

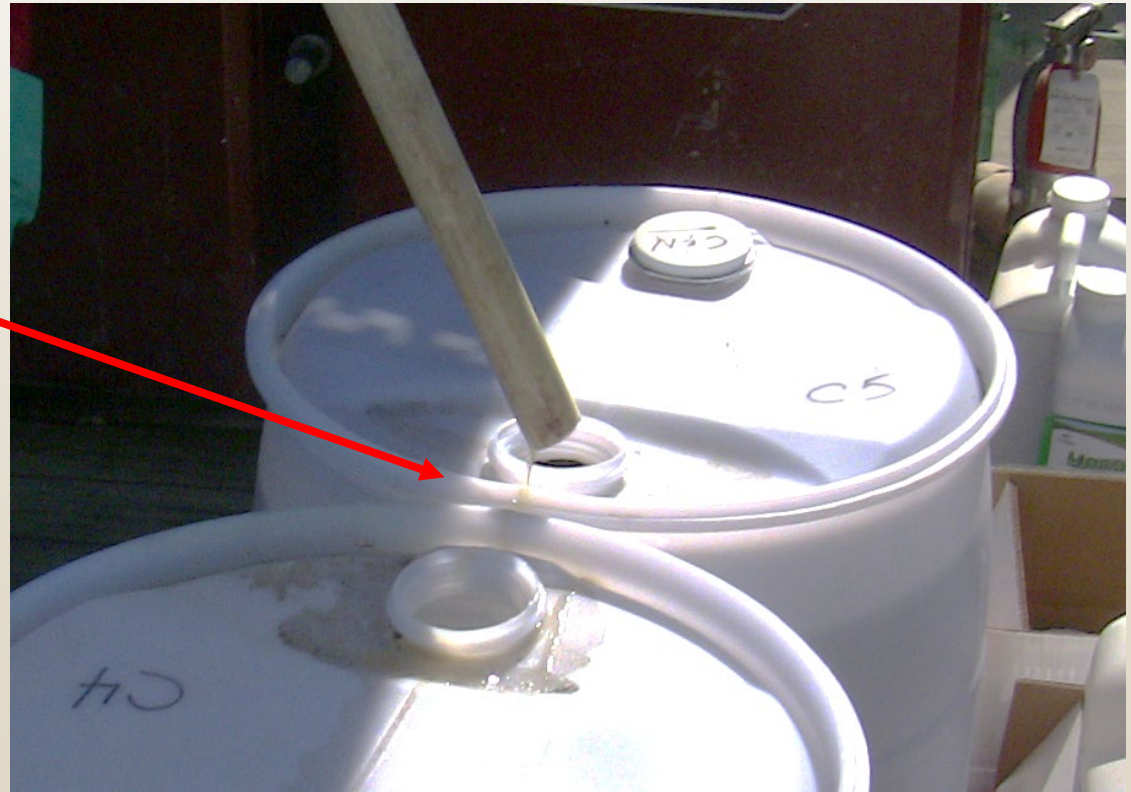
Do not insert stinger into bung side of returnable container

Use built in extraction devices

Non-Returnable Containers

- ✔ Rinse stinger inside container prior to removal
- ✖ Removing contaminated stingers increases exposure potential
  - Exposures occur from drips and splashes

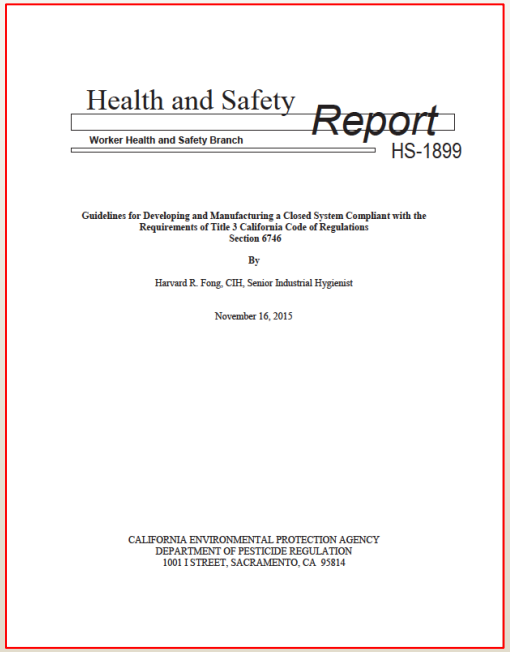
Contamina ted stinger dripping



Rinsing Stingers – Non-Returnable Containers

- Any portion of a closed system that is inserted into a non-returnable container must be designed to clean and rinse itself inside the original container
  - **Rinse stinger prior to removal**

- If the connection to the container opening is a type that does not securely seal to the container opening:
  - Make sure the inserting element has a splash shroud that is 20% greater in diameter than the opening container.
  - Make sure the shroud fits against the opening.


Health and Safety Report
Worker Health and Safety Branch
HS-1899

Guidelines for Developing and Manufacturing a Closed System Compliant with the Requirements of Title 3 California Code of Regulations Section 6746

By

Harvard R. Fong, CIH, Senior Industrial Hygienist

November 16, 2015

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF PESTICIDE REGULATION
1001 I STREET, SACRAMENTO, CA 95814

Reference: DPR HS-1899
*click image to open report

Thank You

Carol Black

Pesticide Education Specialist

Washington State University Extension