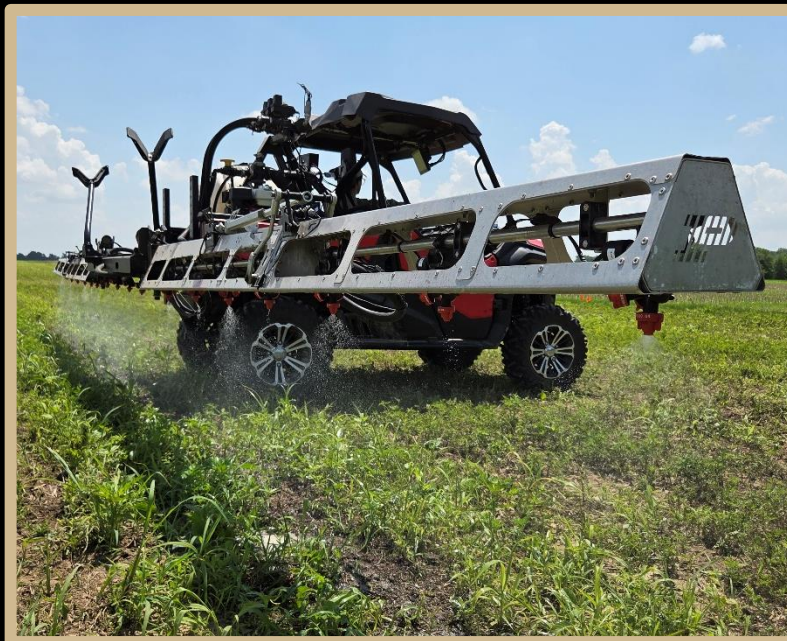


Spraying is Easy, Doing It Right Isn't: Tips for Better Herbicide Applications

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2025 Indiana CCA Conference

*Indianapolis, IN
10 Dec. 2025*

Endangered Species Act

Mitigation Picklist

- No preemergence applications (to the crop)
- Greater than or equal to 30 ft vegetative filter strips on A and B hydrologic group soils⁹
- Greater than or equal to 100 ft vegetative filter strips on C and D hydrologic group soils
- Grassed waterway
- Field border
- Irrigation water management
- Cover crop
- Contour buffer strips
- Contour farming
- Terrace farming
- Strip cropping
- Soil incorporation to a depth of 2.5 cm (1 in)
- No tillage/ reduced tillage

Future Concerns

- Atrazine
- Glyphosate
- Paraquat
- Metribuzin
- Desiccants
- Many residual herbicides
- Aerial applications

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read all Directions for Use carefully before applying.

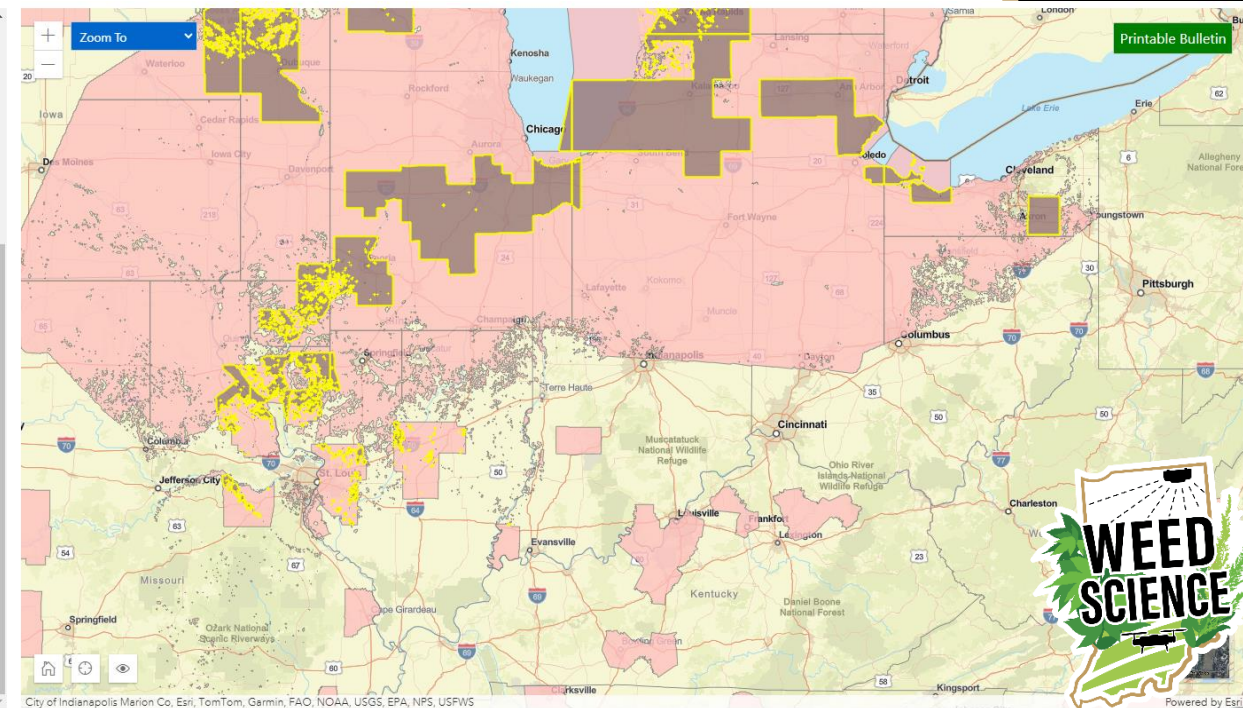
Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state or tribe, consult the agency responsible for pesticide regulation.

Endangered Species

It is a Federal offense to use any pesticide in a manner that results in an unauthorized "take" (e.g., kill or otherwise harm) of an endangered species and certain threatened species, under the Endangered Species Act section 9. When using this product, you must follow the measures contained in the Endangered Species Protection Bulletin for the area in which you are applying the product. You must obtain a Bulletin no earlier than six months before using this product. To obtain Bulletins, consult <http://www.epa.gov/espp/>, call 1-844-447-3813, or email ESPP@epa.gov. You must use the Bulletin valid for the month in which you will apply the product.

Report ecological incidents: To report ecological incidents, including mortality, injury, or harm to non-target plants and animals call 1-855-ENLIST-1 (1-855-365-4781).

Limitations for Selected Area	
Dicamba - 2020	Cyantraniliprole 2023
Pula ID: 52 Event Name: Dicamba - 2020 Application Month: December 2024	
Product	Count
A21472 PLUS VAPORGRIP TECHNOLOGY (100-1623) Alternate Names: TAVIUM PLUS VAPORGRIP TECHNOLOGY	1
ENGENIA HERBICIDE (7969-472)	1
FEXAPAN PLUS VAPORGRIP TECHNOLOGY (352-938)	1
TAVIUM PLUS VAPORGRIP TECHNOLOGY (100-1623) Alternate Names: TAVIUM PLUS VAPORGRIP TECHNOLOGY	1
XTENDIMAX WITH VAPORGRIP TECHNOLOGY (264-1210) Alternate Names: M1768 Herbicide	1
Full Details	
Clear Selected	



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Weed Science



Endangered Species Act

Runoff Mitigation

Mitigation Menu | US EPA

epa.gov/pesticides/mitigation-menu

An official website of the United States government

EPA

United States Environmental Protection Agency

Environmental Topics

Laws & Regulations

Report a Violation

About EPA

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Pesticides

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Biopesticides

Contact Us About Pesticides

Mitigation Menu

Date of last update: April 30, 2025

On this page:

How do I know if Runoff/Erosion Mitigation is Required?

Runoff/Erosion Mitigation Options

How do I know if Ecological Spray Drift Buffers Are Required?

Ecological Spray Drift Buffer Reduction Options

How do I know if Runoff/Erosion Mitigation is Required?

Pesticide users will need to plan their pesticide

Helpful Links

Purpose and Background of Mitigation Menu

Bulletins Live! Two

USDA's Web Soil Survey tool to determine soil texture

EPA's ESA Workplan Update

Herbicide Strategy Docket

Mitigation Menu | US EPA

epa.gov/pesticides/mitigation-menu

Click here for a PDF version

Mitigation Menu Runoff Tables (pdf)

Table 1. Mitigation relief options.

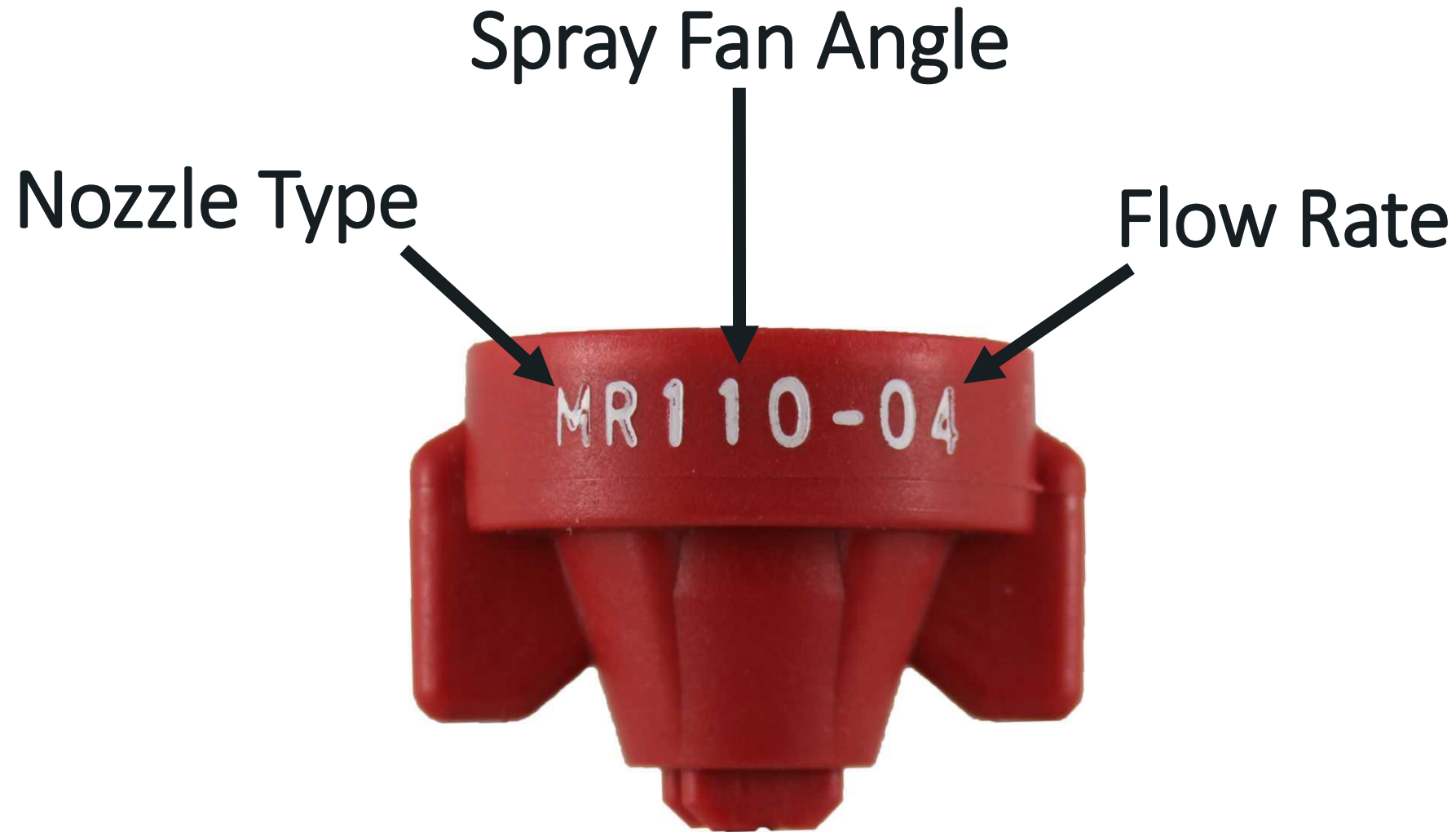
Mitigation Relief	Pesticide Runoff Vulnerability and Field Characteristics	Points
County-based mitigation relief [see runoff vulnerability map by county and County list (pdf)] Select one option	Pesticide runoff vulnerability - very low	6
	Pesticide runoff vulnerability - low	3
	Pesticide runoff vulnerability - medium	2
	Pesticide runoff vulnerability - high	0
Field slope	Field slope ≤3% (naturally low slope or flat fields; flat laser leveled fields)	2
Predominantly sandy soils This option can only be used if the product label does not prohibit application on sandy soils	Fields with 10-20% clay and 50-90% sand (includes loam, silt loam, or silt soil) without a restrictive layer that impedes the movement of water through the soil (also described as Hydrologic Soil Group B)	2
	Fields with ≤10% clay and ≥90% sand (includes sand, loamy sand, or sandy loam soil) without a restrictive layer that impedes the movement of water through the soil (also described as Hydrologic Soil Group A)	3
Mitigation tracking	Documented at the field or farm level, using paper or electronic format	1
	The technical specialist must meet the following characteristics: <ul style="list-style-type: none">Have technical training, education and/or experience in an agricultural discipline, water or soil conservation, or other relevant disciplines that provides training and practice in the area of runoff or erosion mitigation technologies/measures; andParticipate in continued education or training in the area of expertise which should include runoff and erosion control; andHave experience advising on conservation measures designed to develop site specific runoff and erosion plans that include mitigation	1

WEED SCIENCE



NOZZLES

Nozzle Information



Changing Nozzles -> Droplet Size

XR11003VS

40PSI

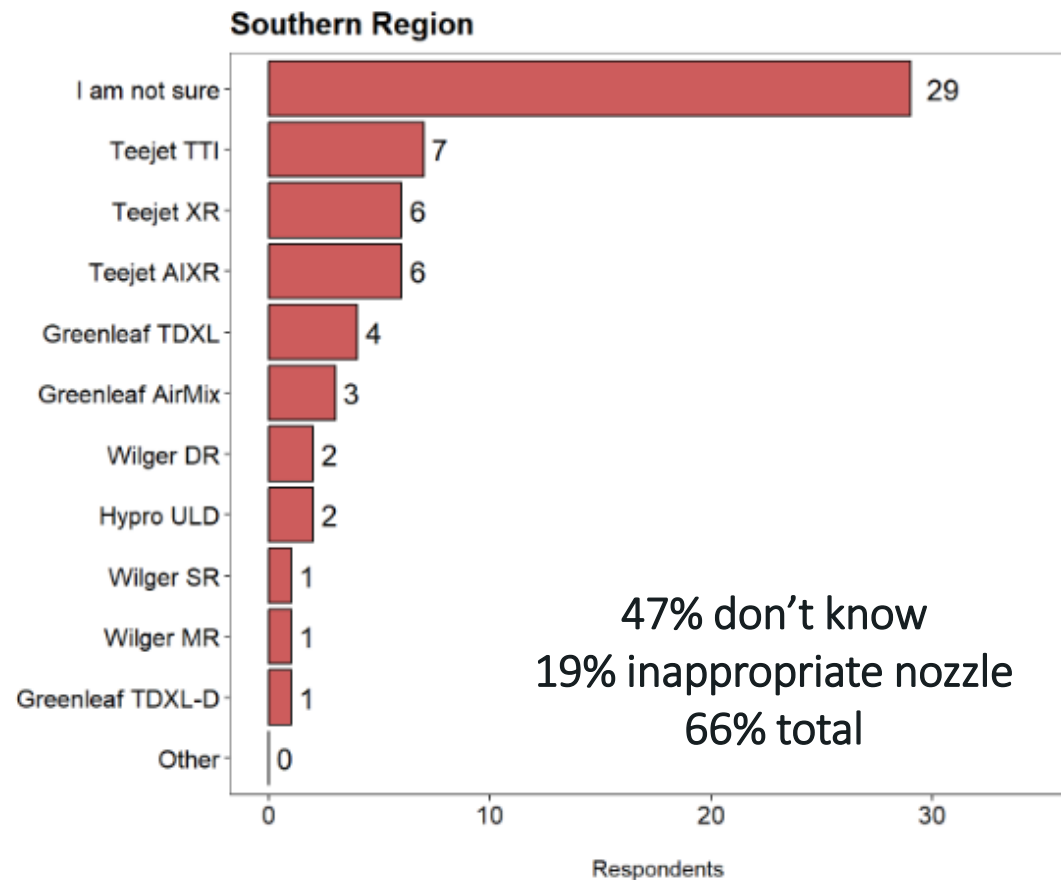
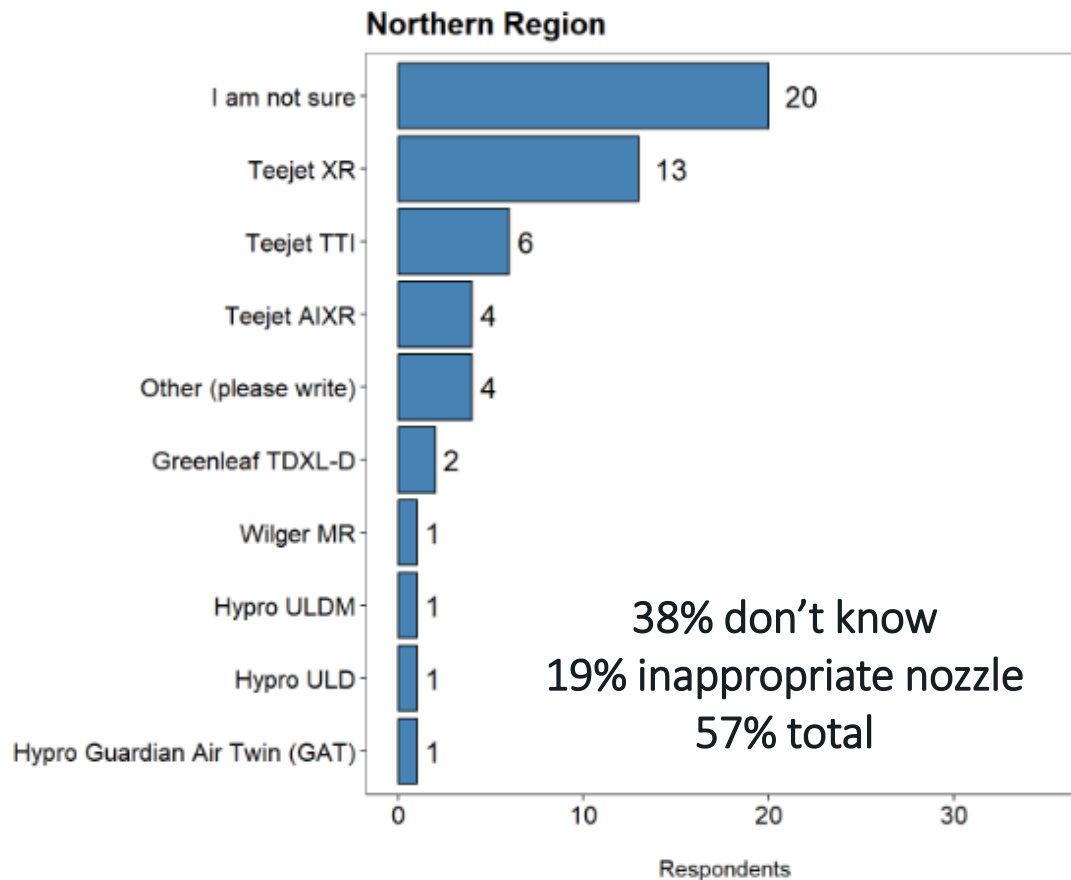


TTI11004

40PSI



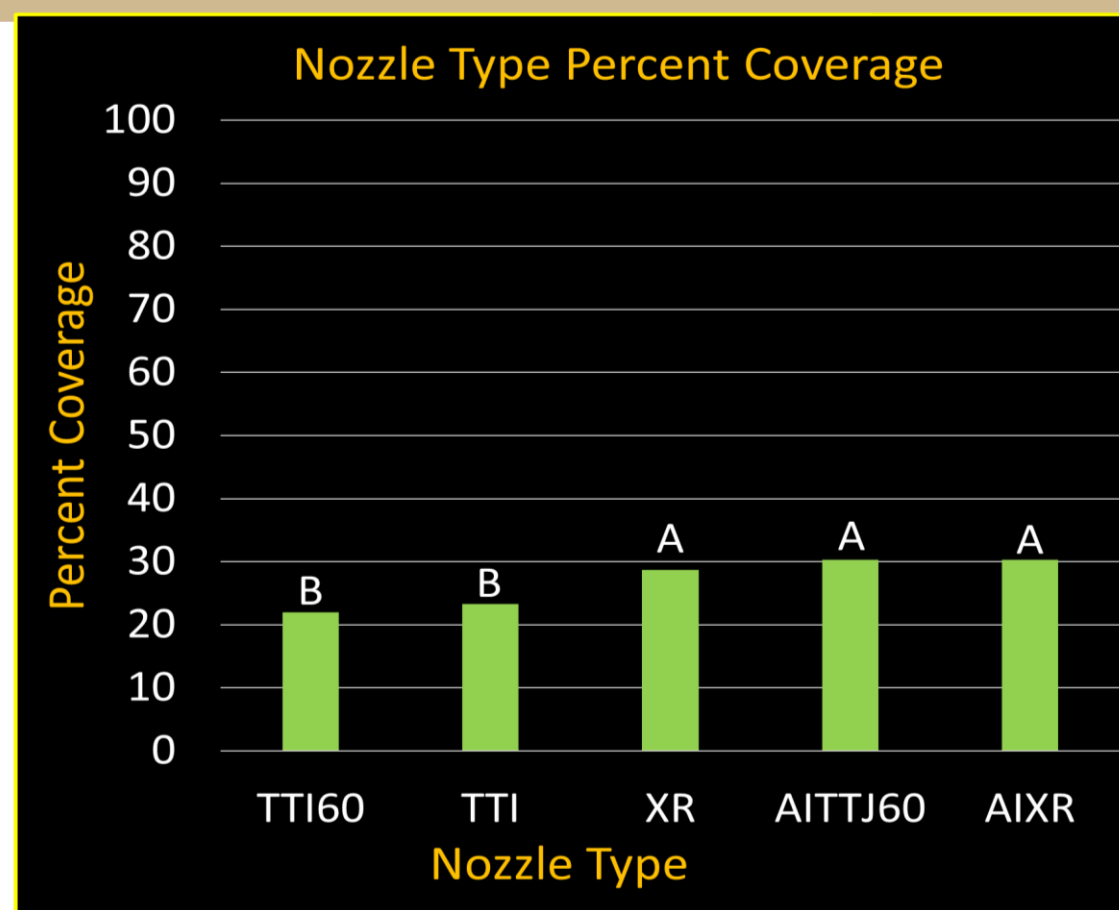
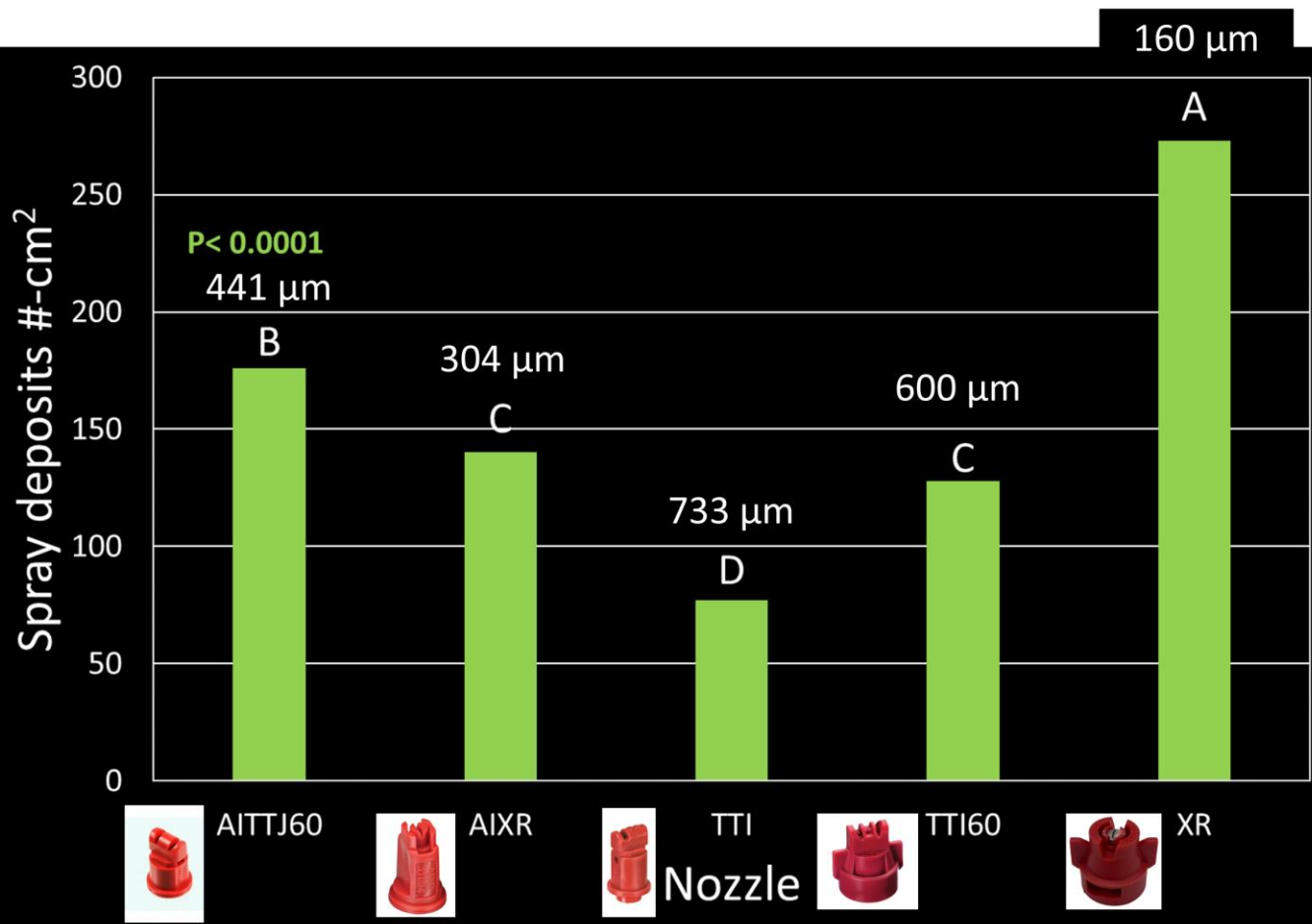
Glufosinate (Liberty) Usage Survey Results



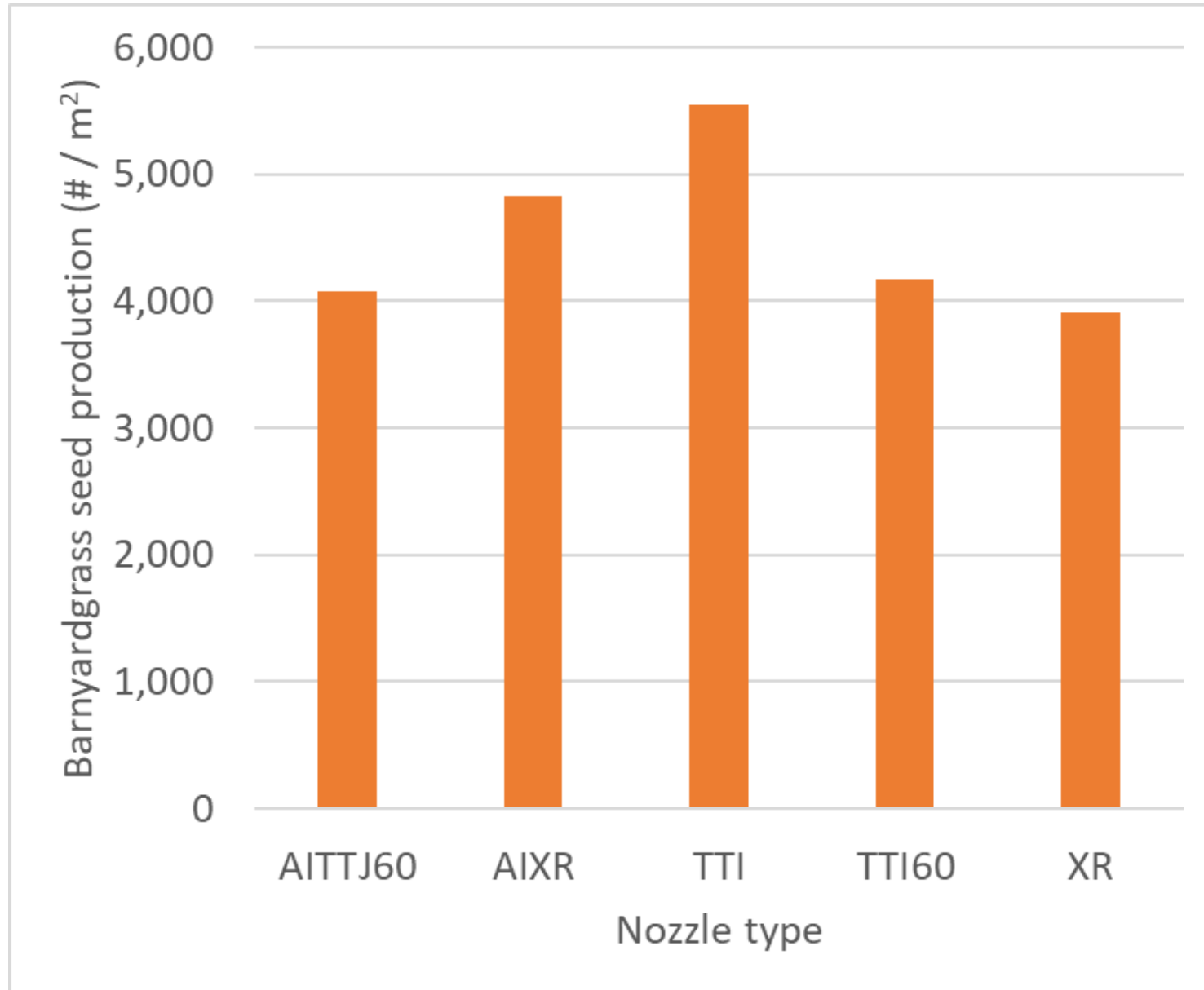
Figures courtesy of: Nikola Arsenijevic and Dr. Rodrigo Werle, UW-Madison



Spray Coverage & Deposition



Barnyardgrass Seed Production



Barnyardgrass Seed Production

- *Dual-fans may aid in improving long-term suppression of weeds.
- **Dual-Fans do not **always** mean better coverage & weed control.
- ***Often more expensive!



Importance & How To's of Nozzle Sizing

Example Calculation:

→ (10 GPA x 20 inch x 20 mph)/5,940



→ 0.67 GPM



54 PSI



31 PSI

→ PWM (operated at ~70% duty cycle)



= 40 PSI

$$GPM = \frac{GPA \times w \times mph}{5,940}$$

Where:

GPM = gallons per minute

GPA = gallons per acre

w = nozzle width/spacing (in inches)

mph = sprayer speed (in mph)



Importance & How To's of Nozzle Sizing

Example Calculation:

→ (10 GPA x 20 inch x **12 mph**) / 5,940



→ **0.40 GPM**



18 PSI



10 PSI

→ PWM (operated at **~40% duty cycle**)



= 40 PSI

$$GPM = \frac{GPA \times w \times mph}{5,940}$$

Where:

GPM = gallons per minute

GPA = gallons per acre

w = nozzle width/spacing (in inches)

mph = sprayer speed (in mph)



Importance & How To's of Nozzle Sizing

Example Calculation:

$$\rightarrow (10 \text{ GPA} \times 20 \text{ inch} \times 12 \text{ mph}) / 5,940$$

Moral of the story:

When sizing nozzles, need to consider the **RANGE** of speeds operated, not just the maximum.



= 40 PSI

Nozzle Decisions are Key!

Nozzle decisions will
impact the following:

- Droplet size
- Spray drift potential
- Flow rate
- Spray pattern
- Compatibility with
adjuvants/formulations
- Spray coverage/deposition

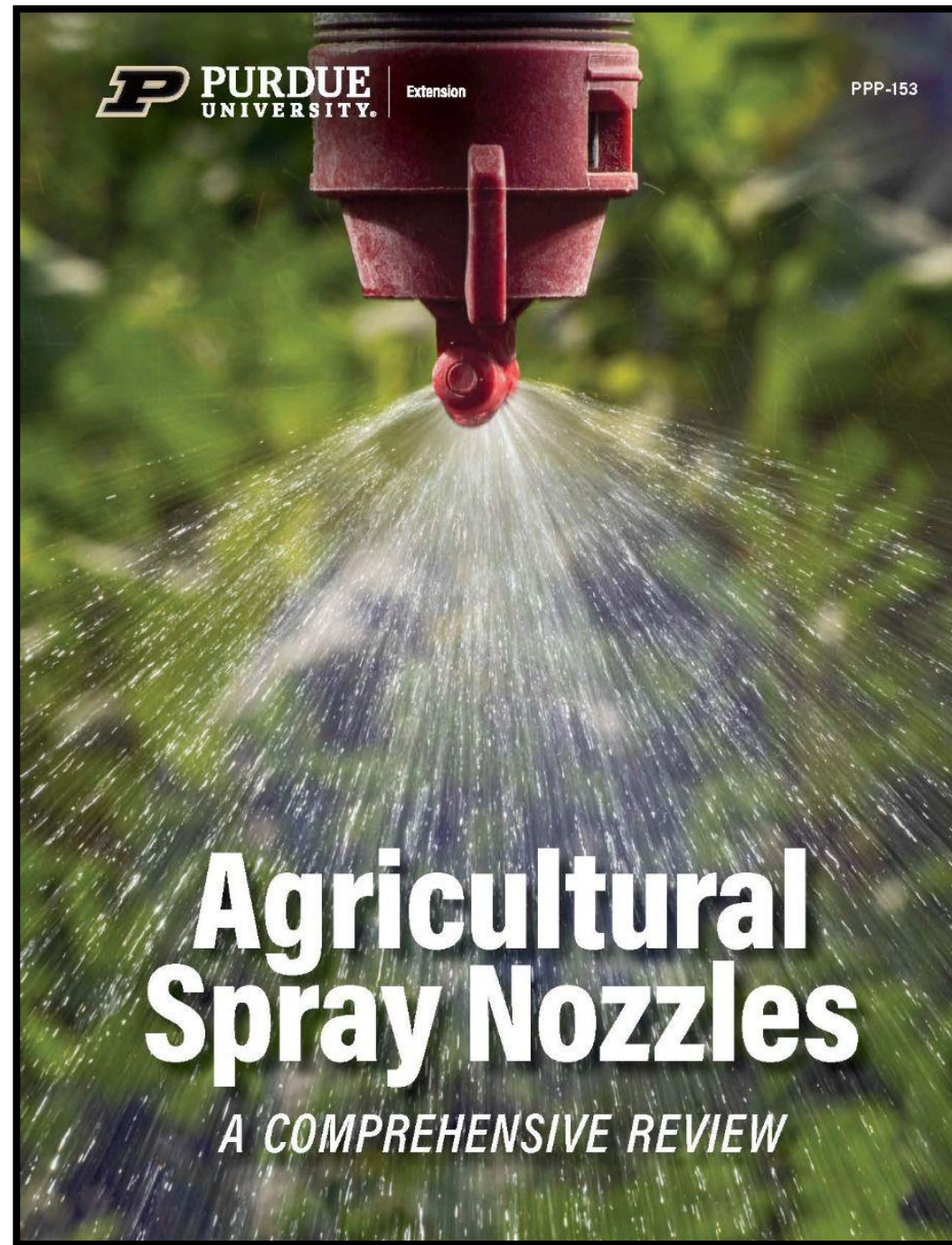
*Last opportunity to control an application before
it's in Mother Nature's hands!*

Company Man



SCAN ME

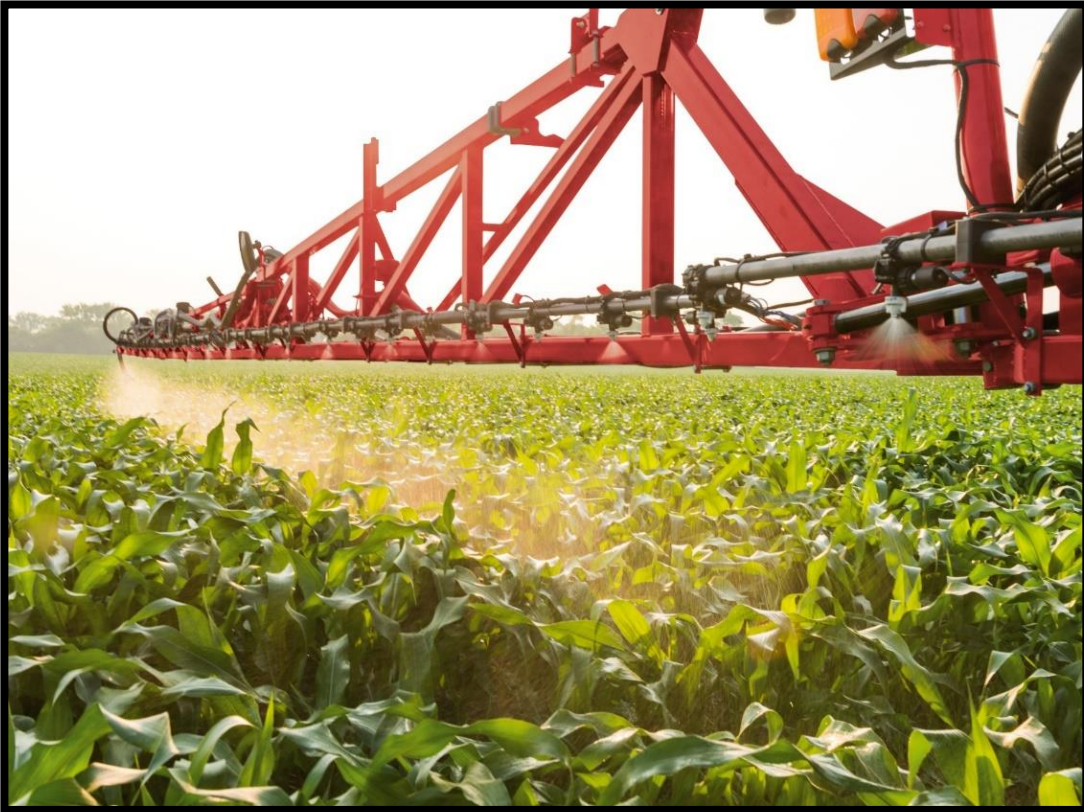
<https://edustore.purdue.edu/ppp-153.html>



PWM



Where can PWM help?



- **Around field borders**
 - Reduce speed
 - Don't have to change nozzles
 - Assist with drift reduction strategies
- **Site-specific applications**
 - Maintain precise droplet size (reduce drift but maintain efficacy)
 - Minimize overlap and output errors
- **Application flexibility**

With all this pulsing wouldn't PWM leave skips?

Blended Pulse

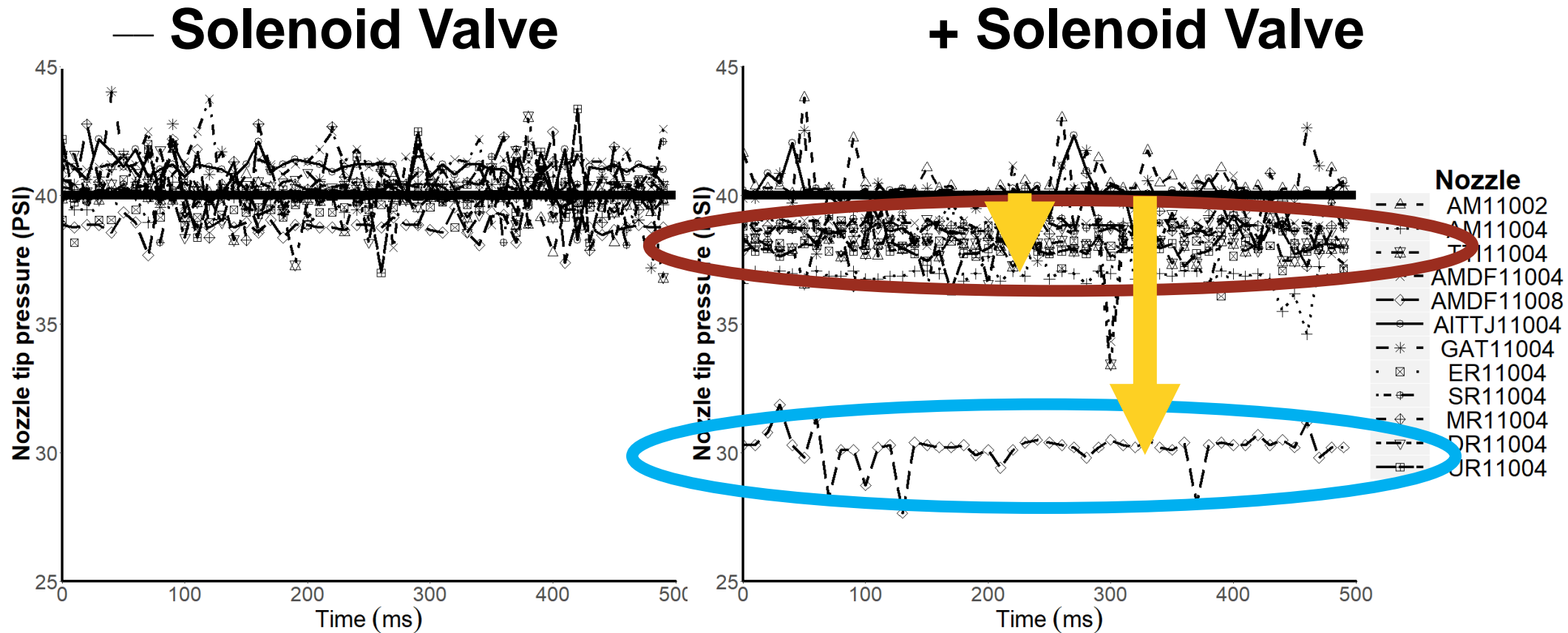
Calculation:

- 20 mph = 29.3 ft/s
- 10 Hz (10 pulses per second)
- ~3 feet between every pulse
- If operating at a 50% duty cycle, this means 1.5 feet distance traveled before nozzle is back on again
- If operating at a 50% duty cycle, adjacent nozzles are never off at the same time



PWM Best Use Practices

40 PSI



PWM Best Use Practices



- Use only non-venturi (non-air induction) type nozzles
- Optimal duty cycle range is 50 – 100%
 - Best recommendation to stay between 70 – 90%
- If drift mitigation can still be maintained, use higher application pressures (≥ 40 psi)
- Be aware of pressure loss through the solenoid valves

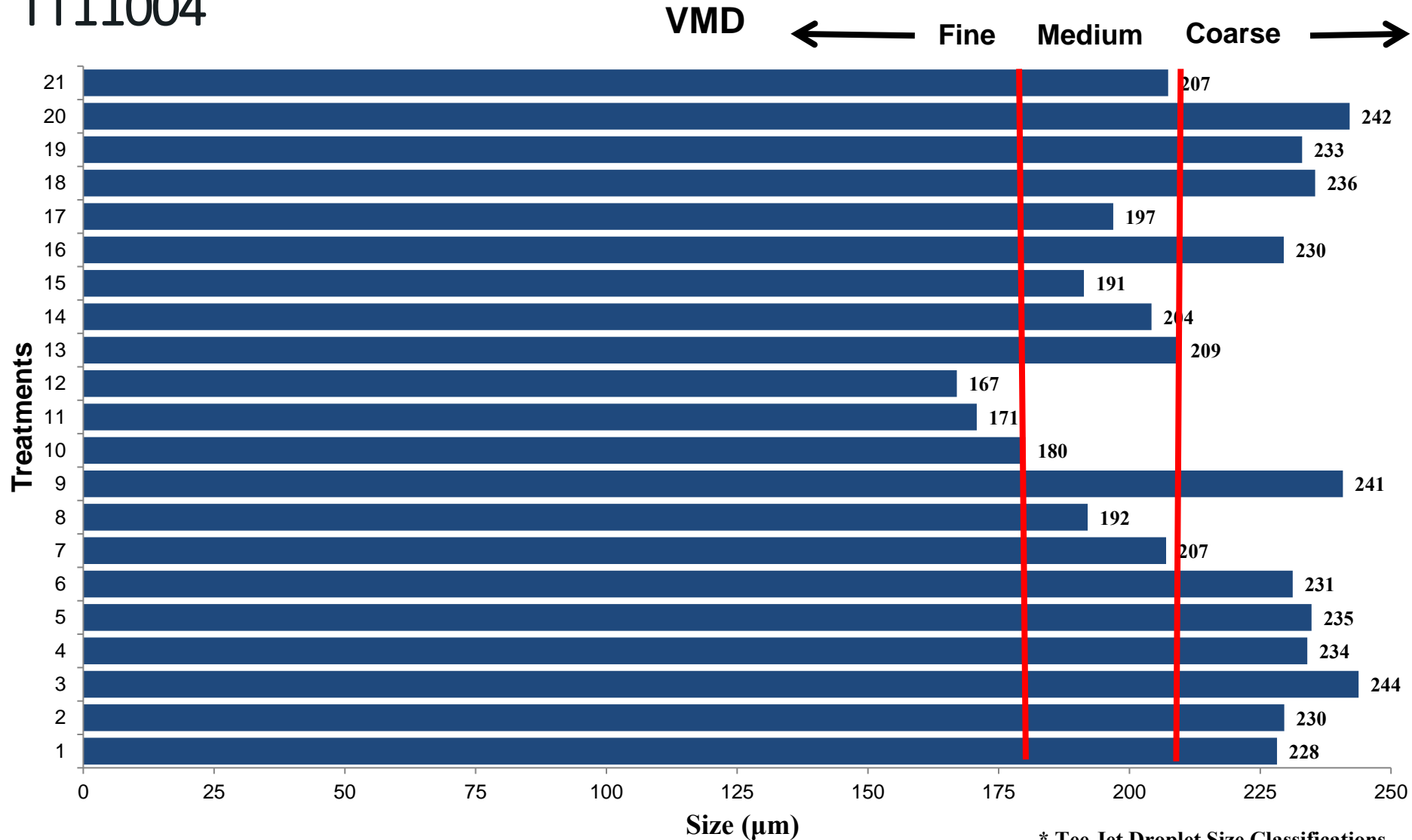
OTHER CONSIDERATIONS



Effect of Various Adjuvants on a “Medium” Spray Quality



TT11004



Proper Mixing

- The old “Fill the tank 50 to 75% full, then add the herbicides” may not be so advisable anymore...
- If using induction tanks (right), DO NOT mix concentrated herbicides together...
 - Add 1 herbicide, flush with water
 - Add second herbicide, flush with water, etc.
- As a result, maybe start with tank 25% full to allow for extra system flushing.



Thank you to our supporters:



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viewers
like you!**

Thank you! Questions?



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